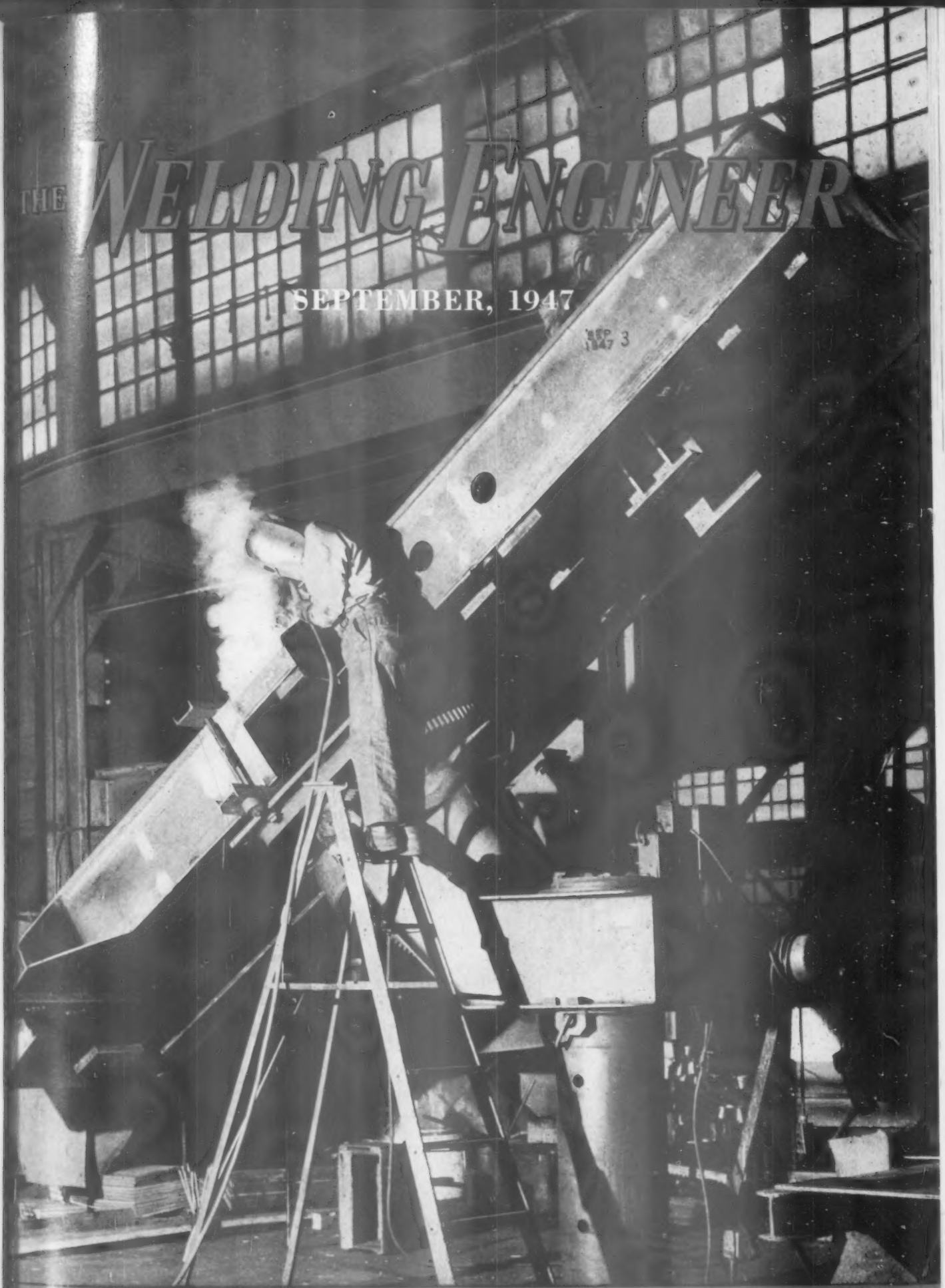
THE WELDING ENGINEER

SEPTEMBER, 1947



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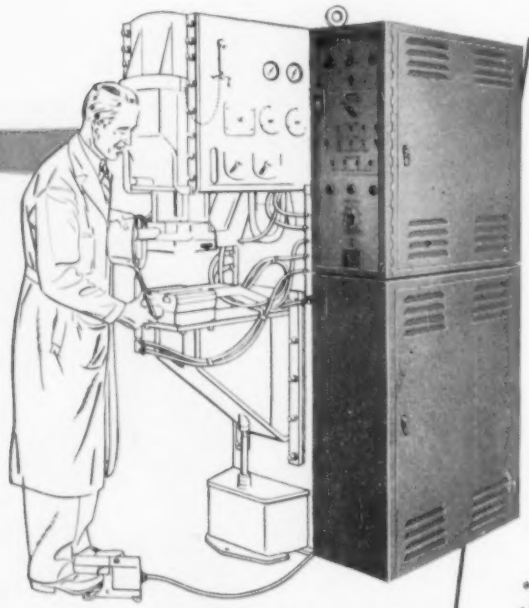

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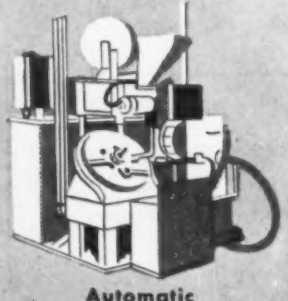
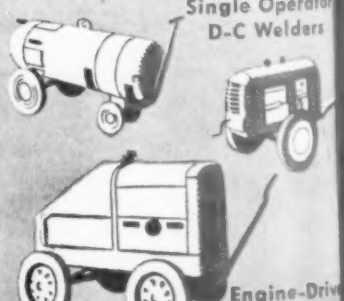


Automatic Welding Equipment



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When Is a Weld Not a Weld?

SHAKESPEARE once said, "Imitation is the sincerest form of flattery." So far as welding is concerned, the truth of the statement is doubtful. There are too many imitators who are not doing a flattering job.

Welding has been accepted by the public to signify strength and durability. A welded joint connotes a permanent union. Something repaired by welding is considered to be equal to or better than the new product. When such terms as "weld," "welded" or "welding" are used, the purchaser feels that he is assured of quality.

It was at this stage of the game that the imitators came in. Their general thinking seemed to be, "Why not hitch a ride on welding's coat tail?" And so we find our favorite words tied up with some strange bedfellows—"welding cement," "weld adhesive" and "steam welded," for instance.

What do these phrases mean? We have wondered and so have many other people—including the Federal Trade Commission. Finally, though, the Federal Trade Commission acted.

The manufacturer of a popular sealing compound "———weld," which is used for repairing cracked cylinder heads, has been restrained from using "weld" as part of its trade name. This restraining order was issued by the Federal Trade Commission on the basis of a Bureau of Standards investigation which found that the compound was incapable of producing "results such as are accomplished through a welding process."

When the word "weld" is used in relation to metals. the Federal Trade Commission pointed out, it is generally defined as a "localized union or consolidation of metals." In its findings the FTC describes various welding processes as follows:

"Heating of metals to temperatures below their fusion temperatures, with consolidation brought about by pressure.

"Heating of metals to or above fusion temperature, followed by the application of pressure.

"Fusing of metals at the surfaces to be joined by the application of heat, with or without the application of fused metal from a filler rod, but without the application of pressure."

As the misrepresentations are cleared up, we will find that welding remains welding as we know it today. A man will not visit the local hardware or drugstore and be sold a welding glue; he will not be led to expect that any glue will do a welding job.

As more and more of these misuses of "welding" are brought to light, the public will be made fully aware of the value of welding and welded products. Let's help keep them straight by applying the terms correctly ourselves.

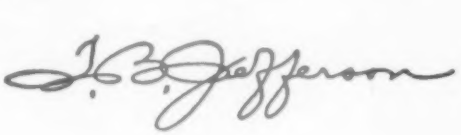

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Fig. 1—Prototypes for three-wheeled Mathis aluminum car of monocoque construction. Each has 6,000 spot welds

Spot Welding French Autos

Bombed almost out of existence during the war, the French automobile industry is staging a dramatic comeback. The ingenious spot-welding techniques developed might be profitably studied here in the United States.

BY MICHAEL MARSH
McGraw-Hill World News, Paris

WELDING is taking an ever bigger place in French automobiles. Renault, the largest auto maker, whose newly nationalized factory on the Seine near Paris employes 30,000 workers, uses chiefly spot welds, supplemented by arc welding, to put together the 80 lightweight Juvaquatre cars daily turned off the production lines. Each of these small cars contains about 4,750 spot welds. Several multiple spot welders are now on order from U. S. manufacturers, and, starting in the fall of 1947, Renault hopes to have in operation one of the world's most modern assembly lines.

CHAUSSON ACTIVE, TOO

An all-welded bus with 44,000 spot welds is being turned out by Societé des Usines Chausson, which monopolizes the French auto radiator business and has branched out, through a subsidiary, into the auto body field. The same firm is just getting the welding assembly line going on its all-welded, 1½-ton delivery truck, using 10,500 spot welds per vehicle plus several long automatic arc welds.

Chausson's chief welding engineer, André Vivien-Raguet, has induced French welding machine makers to deliver for this assembly line 15 new-type guns of his own design. Each of these guns carries the transformer right above the pincers, avoiding most of the high current loss between transformer and electrodes. The Chausson machines operate with only about 10% current loss from welding cables.

M. Vivien-Raguet has also pushed his investigations into high-frequency current for spot welding. Using 200-cycle current, he has developed a unified transformer pincers, not yet in production use, which weighs less than 18 lb but is said to give the same power at the electrodes as ordinary guns.

Considerable spot welding is also used in several of the new aluminum-alloy light cars recently developed by French designers. The extreme example is the three-wheel Mathis 333 (Fig. 1), designed by Jean Andreau with the aid of the Societé d'Aluminum Français. This is all spot welded—some 6,000 spot welds. Some new French racing cars have also made large use of spot-welded aluminum. Most notable example is the chassis of the DB, to be later described.

At the great Renault plant, which spreads over 250 acres at Billancourt-sur-Seine, nearly all the welding machines as well as most of the factory were destroyed in the three terrific bombings suffered during the war. Since Liberation, the factory has been completely reconstructed, and a new complement of welding equipment has been acquired.

To make the 80 Juvaquatre autos and the 110 trucks turned out each day, Renault has a present equipment of 350 fixed resistance-welding machines, 250 arc welders and 150 mo-

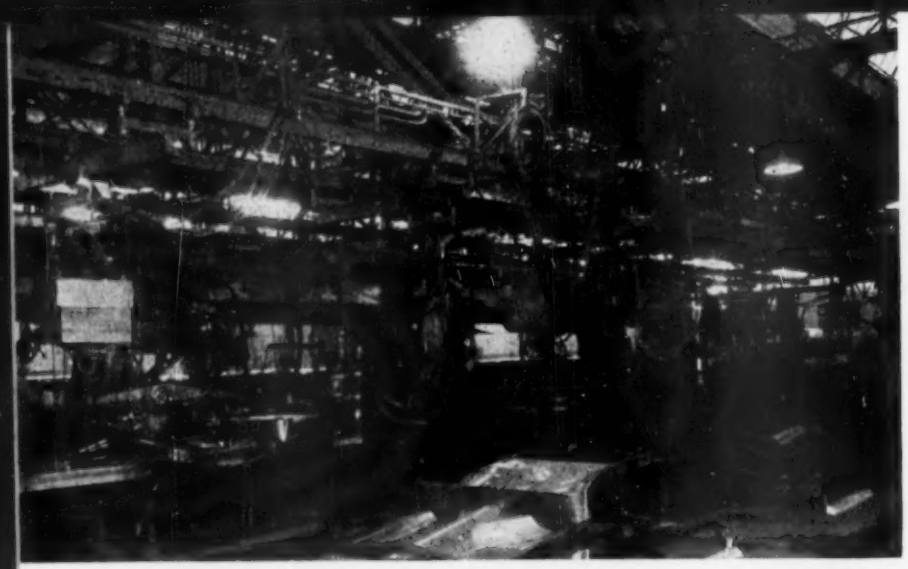


Fig. 2—This partial view of the assembly line for floor sections of the Juvaquatre car, Renault plant, shows the extensive use of mobile welding guns

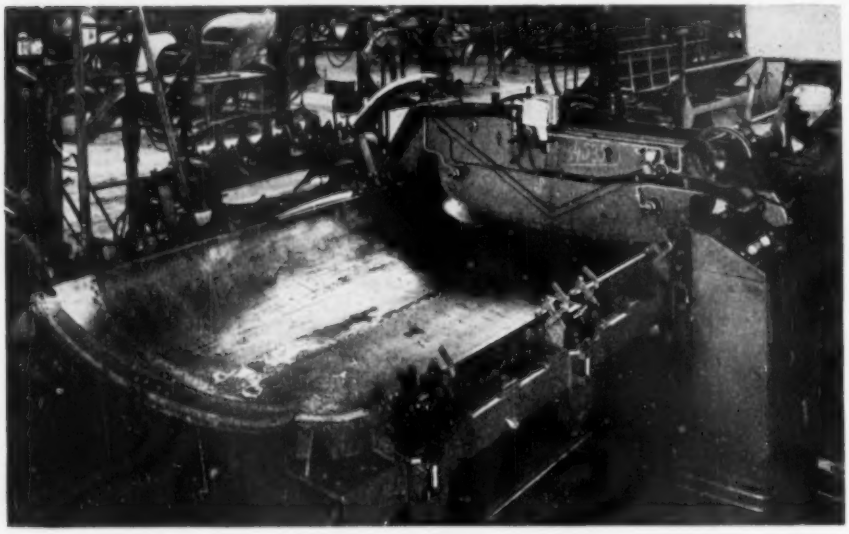


Fig. 6—Semiautomatic spot welder developed at Chausson for joining roof panel to framework. The welding head has two movable electrodes which are carried by chain drive across the length of the crosswise stringers

bile guns. Of the fixed machines, about 100 operate by pedal at 20 kva, about 200 are automatic compressed-air-operated with power varying between 45 and 200 kva and 50 or so are flash welders.

Juvaquatre Assembly Line

None of the machines at Renault (or elsewhere) are electronically controlled, and the only multiple spot welder to be seen was an experimental three-electrode machine at Chausson. Queried about use of multiple spot welders, H. P. Lefebvre, chief of the welding department at Renault, lamented the lack of dollars needed to order more than the few now awaited from the U. S. Smaller French firms generally do not have the mass volume needed to pay for these high-cost machines.

In the Renault assembly operations for the Juvaquatre car, the impression is of a welding shop pure and simple (Figs. 2 and 3). Seventy-six guns are used in the various subassembly lines and in the final chain, plus 40 fixed machines spotted along the way and a number of booths for arc welding. Oxy-acetylene welding is also extensively used for touching-up operations. Electrical controls for the 76 mobile welding guns are placed along a platform under the ceiling of the assembly building, where they form a row over 100 yards long.

In the final assembly of the car's floor sections, the chassis and floor panel are mounted together on fixed jigs and clamped down while five guns work at once on the job. The all-welded body and roof panels are fabricated with 4½-lb welding guns.

One roof assembly is accomplished from the bottom up. The members are lifted six or seven feet off the floor to a set of jigs. The welding gun, powered from a transformer on the floor, is operated from below and inside the clamped panels which are to be welded.

Where a smooth exterior is important, the company saves polishing by the use of a copper-plate electrode shaped to the curve of the surface to be welded. Welding takes place through this plate, which is brought up against the outer surface of the part. This method is used, for example, at the bottom rear of the car to the lower edge of the swept-down roof panel to the floor panel. This particular job takes place at the joining of the floor and body assemblies. The jig for the operation is surrounded by five guns: two above at the sides, one in front, two at the rear.

Several small spot welding jobs of considerable thickness are undertaken for the Juvaquatre. An example is the joining of two small 1.5-mm (0.059 in.) pieces to each side of an 8-mm (0.315 in.) cast piece in order to form an inner support for one of the chassis beams. In terms of thickness, however, the most difficult job at Renault is the rear axle assembly for the firm's 3.5-ton and 7-ton trucks.

As shown in the sketch (Fig. 4), the housing for the differential on these trucks consists of two outer hemispheres. Inner support is provided by two semicircular reinforcements. Both outer and inner housing are of 5.5-mm (0.216 in.) steel plate, and the two are spot-welded together, forming a welded thickness of 11 mm (0.433 in.). A 200-kva machine is used in the operation, which takes between ¼ and ⅓ seconds.

Joining of the two halves of the exterior housing along the length of the axle is done by arc welding. This, too, is a considerable job since the overall axle assembly is 47 in. long. The brake-drum housings are joined to the axles by flash welding.

In the Chausson company's body plant, employing 2,500 workers, about 400 resistance-welding machines are in use, including 210 mobile guns and 190 fixed welders. The fixed machines generally oper-

Fig. 3—Final assembly of the Juvaquatre is also accomplished by means of spot welds, as this picture shows

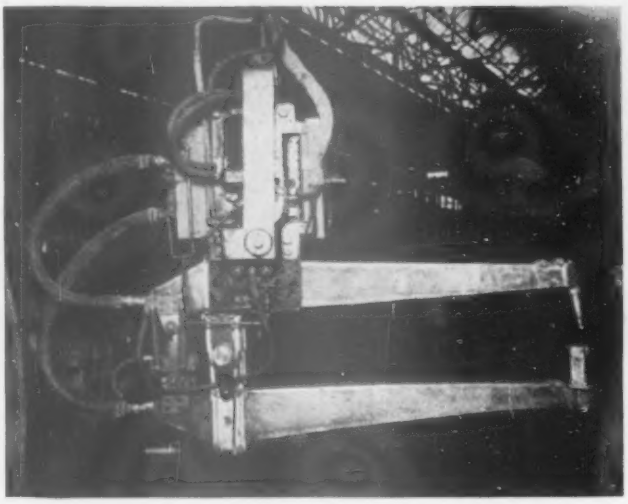


Fig. 5—This giant welding gun has a throat of 45 in., is employed for truck assembly at the Chausson body plant. The transformer rides above the pincers, obviating the need for long cable with large power losses

ate between 50 and 80 kva, and the mobile guns vary from 40 kva for those welding 1 mm (0.039 in.), done in about ⅛ second, up to 150 kva for those welding 3-mm (0.118 in.) beams, accomplished in slightly over ¼ second. This plant makes 1½-ton panel delivery trucks and busses and also all of the bodies for the French Fords.

Both delivery truck and bus are almost wholly spot welded, following largely similar procedures. The company regards the truck assembly line as one of the most modern in France.

Spot welding is carried so far in this truck as to include the chassis-to-axle link members on which the whole weight of the truck rests. These 3-mm members are welded to the 1½-mm chassis frame by the new-type guns which carry the transformer down with the pincers, and the use of this special French welding gun allows power to be reduced from 150 to 50 kva.

The longest-throated gun employed on the trucks has a throat of about 45 in. (Fig. 5). This gun also brings the transformer as close as possible to the welding pincers, avoiding the need for long cables.

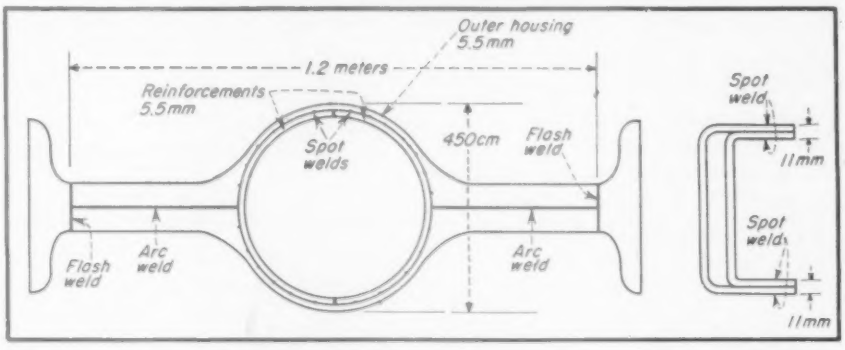


Fig. 4—Schematic diagram of rear axle assembly on Renault 3.5-ton and 7-ton trucks. The housing for the differential consists of two outer hemispheres, forming a total welded thickness of 11 mm or 0.433 in.

Fig. 7—These two large wheels position the chassis-floor complex for arc welding. The complex is assembled on the dolly clamped to the rails

Rolling Electrodes

For spot welding of the roof panel to the framework of metal stringer supports, a technique new to the American welding industry has been developed. Instead of a seam welder, a two-electrode rotatable spot-welding head is employed (Fig. 6). The assembly to be welded is clamped to a copperplated form, above which rides the movable welding head. Controlled by an operator at the wheel on the upper right of the picture, the two electrodes are carried on a chain drive across the length of one of the crosswise stringers, welding the stringer to the roof panel as they go with a series of spot welds. Transformers rest on the top of the machine. When one stringer is finished, the machine is moved down to the next, and the process repeated.

For an analogous assembly on the bus, rolling semimobile guns are used instead.

In both truck and bus, the chassis beams are arc welded. To allow easier access to the chassis for welding, the chassis assemblies in both cases are mounted at each end of large revolving wheels (Fig. 7). By turning these wheels, any desired angle of attack for welding can be obtained. In Fig. 7, for example, the chassis is almost exactly upside down. The dolly to which the chassis-floor complex is attached is clamped, as shown, to the rails at the bases of the wheels. The large dolly on which the chassis-floor complex rests as it is gradually assembled is in itself an ingenious development in the truck assembly line. These dollies pass on rails across the floor of the plant; then at the end, as the assembly is lifted onto the wheels mentioned above, the dolly is lowered to an underground chain which returns it to the original position at the start of the operation.

In one case at Chausson, automatic arc welding is replacing spot welding. The side panels of the delivery truck, which were designed to curve at the rear to receive the rear door, are 8 ft 2 in. long overall. To make these panels of a single pressed sheet would, under present conditions in France, require special lengths of steel and a special press. To avoid this, the solution first adopted was to spot weld the small curved piece at the rear onto the flat side section of the panel. The irregularity caused by the joining was then smoothed off with a melted tin solder.

Now automatic arc welding is being employed to join the two sections, avoiding the need for the soldering operation. Each side of the truck consists of two such side-panel assemblies, one 31 in. and the other 24 in. wide. Successful automatic arc welds are being obtained over these lengths, despite the imperfect electrodes produced in France.

Stress-Skin Construction

Highly unusual in both design and appearance, the three-wheeled Mathis aluminum car (Fig. 1) is of "monocoque" construction. This means that there is no separate chassis, and every single panel in the car, save the hood and fenders, is a working member subject to stress. To meet the problems involved in this construction, the designers turned 100% to welding. Testimony of the wisdom of this decision is provided by the car's creator, Jean Andreau:

"On one of these cars, on the road for over two years, not one of the 6,000 spot welds has given way: the original qualities have stayed unchanged, including silence."

In view of the wide variety of welding operations involved (see drawing, Fig. 8), M. Andreau's further statement that, "All assemblies were effectuated without any of the bent edges forming protuberances or crumbling," is also good testimony for welding.

An idea of the smoothness of surface obtained from spot welding may be gained from the photo of the car's floor assembly (Fig. 9).

The few experimental cars of this model so far made have all been

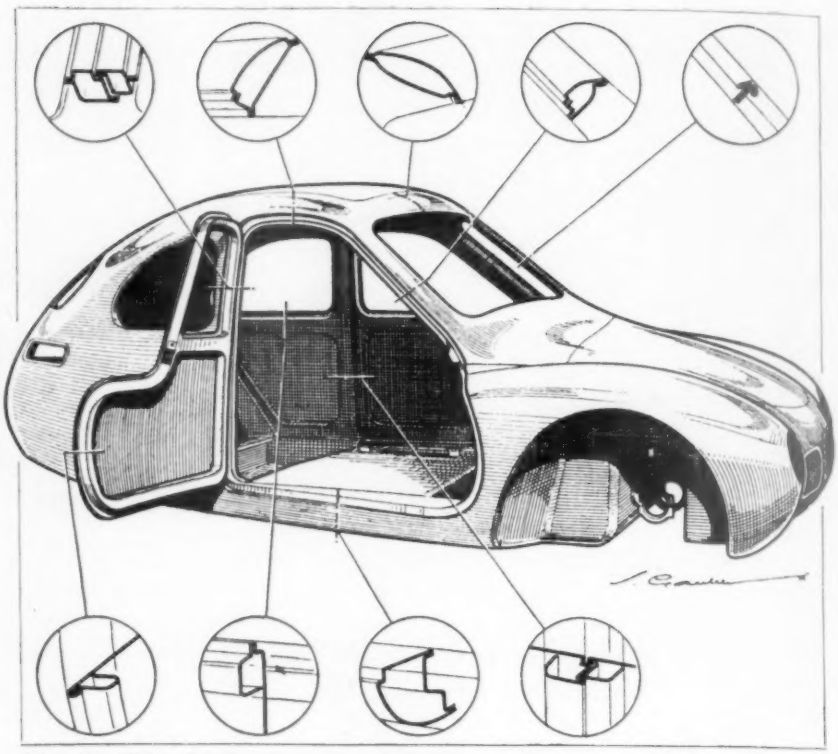


Fig. 8—This sketch shows the different tubular pieces which were spot welded to panels on the stress-skin Mathis car pictured in Fig. 1

Fig. 13—The welded aluminum chassis for the DB car weighs only 45 lb

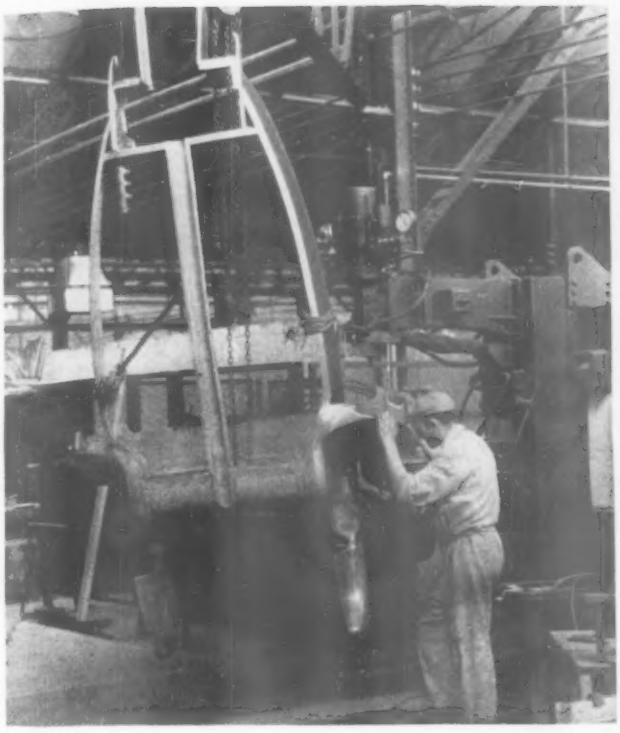


Fig. 10—A fixed 40-kw spot welder was used to weld the Mathis prototypes—an awkward, time-wasting procedure

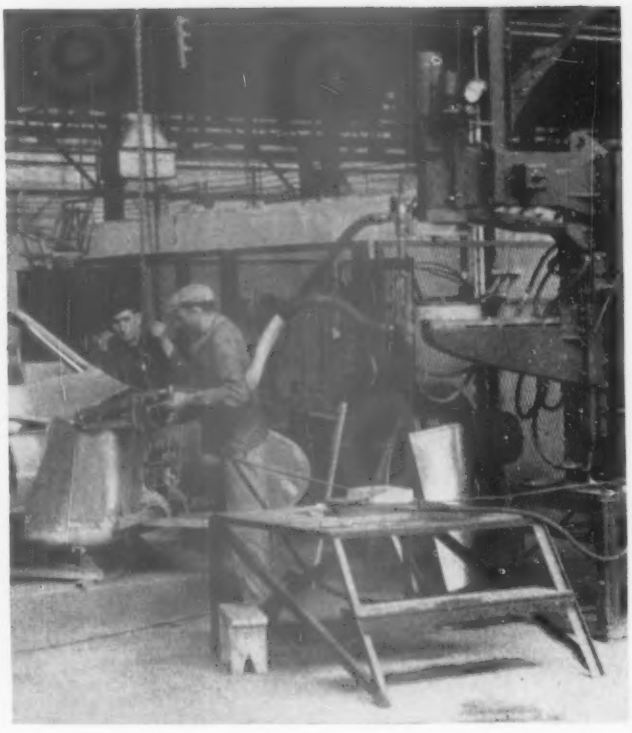


Fig. 11—The welder shown in Fig. 10 was turned into a mobile gun by affixing cables to the electrodes

welded on an old 40-kw fixed spot welder in one corner of the Mathis factory (Fig. 10). As shown in Fig. 11, this machine was turned into a mobile welding gun by simply attaching cable and pincers to the fixed electrodes. The exterior panels are 1-mm aluminum-alloy sheet; the interior panels are 0.8-mm sheet, and certain reinforcements are of 1.5 and 2 mm thickness.

The three-wheel construction is said to allow excellent aerodynamic qualities. With a total body weight of 850 lb, this three-passenger Mathis gets up to 65 miles per gallon of gas. It is scheduled to go into quantity production this year, and two welders as well as several presses have been ordered from the United States.

Spot-Welded Box Chassis

A welding novelty also exists in the two DB aluminum racing cars (Fig. 12) constructed by Deutsch and Bonnet, with the aid of the Societé d'Aluminum Français. As shown in (Fig. 13), the unusual chassis of these cars consists of 2-mm aluminum sheet formed into a box shape and spot welded. It weighs only 45 lb and looks far more like an airplane part than an auto chassis.

Since the body of the DB is also of spot-welded aluminum, this model, unlike most racing cars, consumes very little gas. On a long cross-country jaunt, M. Bonnet reports gas consumption of 26 miles per gallon at an average speed of 65 mph.

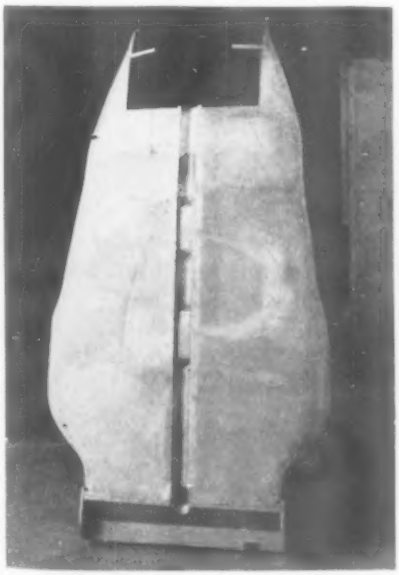


Fig. 9—Floor assembly of the three-wheeled Mathis car. Note the smoothness of the spot-welded surface

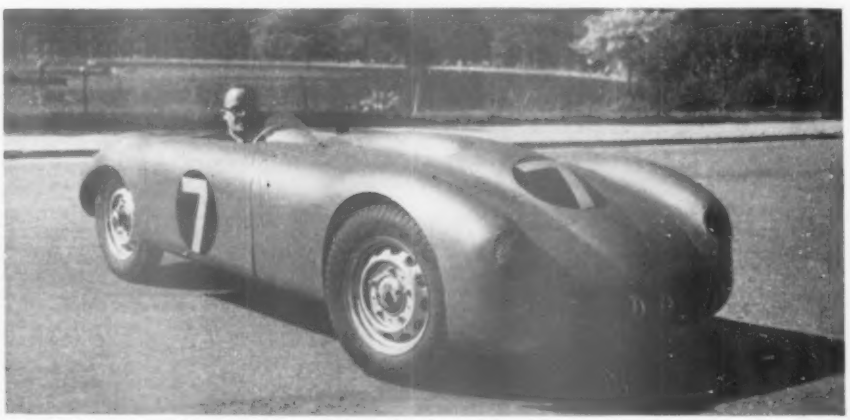
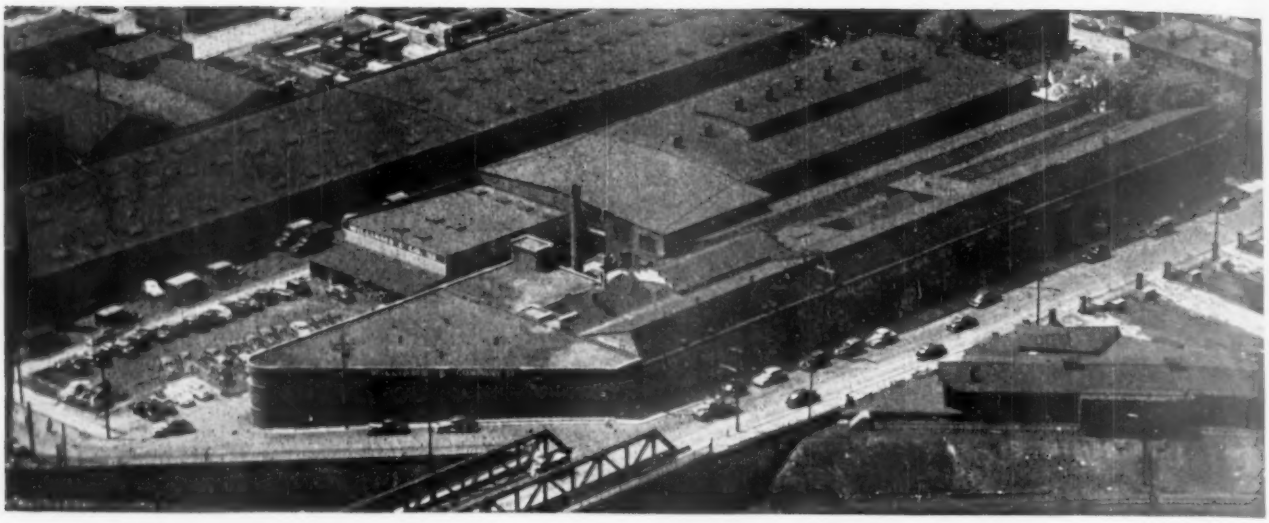


Fig. 12—One of the new DB racing cars of spot-welded aluminum



Air photo of Williams' large warehouse and office in the 900 block of Pennsylvania Avenue, Pittsburgh. The company now occupies 130,000 sq ft with a series of buildings

WAREHOUSE

An ample stock, a sales plan and a carefully selected and trained personnel are the ingre

BY CLYDE B. CLASON

PICKING up their morning papers on Thursday June 19 of this year, subscribers to the Pittsburgh *Post-Gazette* were surprised to discover a special 16-page supplement devoted entirely to the activities of a single firm. This astonishing newspaper commemoration of the 40th anniversary of Williams and Co., Inc., speaks volumes for the esteem in which the firm is held.

The supplement, which was of standard newspaper size and format, reached over 300,000 readers, including all regular readers of the *Post-Gazette* and the entire Williams mailing list. It contained a total of 115 news stories (all on Williams) and 32 advertisements from this distributor and the manufacturers whose lines it handles. Not only was the company's long business history related in detail, but the origins and developments of its several departments were separately noted. Biographies and portraits of chief executives and sales personnel were scattered throughout the pages. Brief paragraphs of the status of various Pittsburgh industries at the time Williams was founded helped to complete the picture.

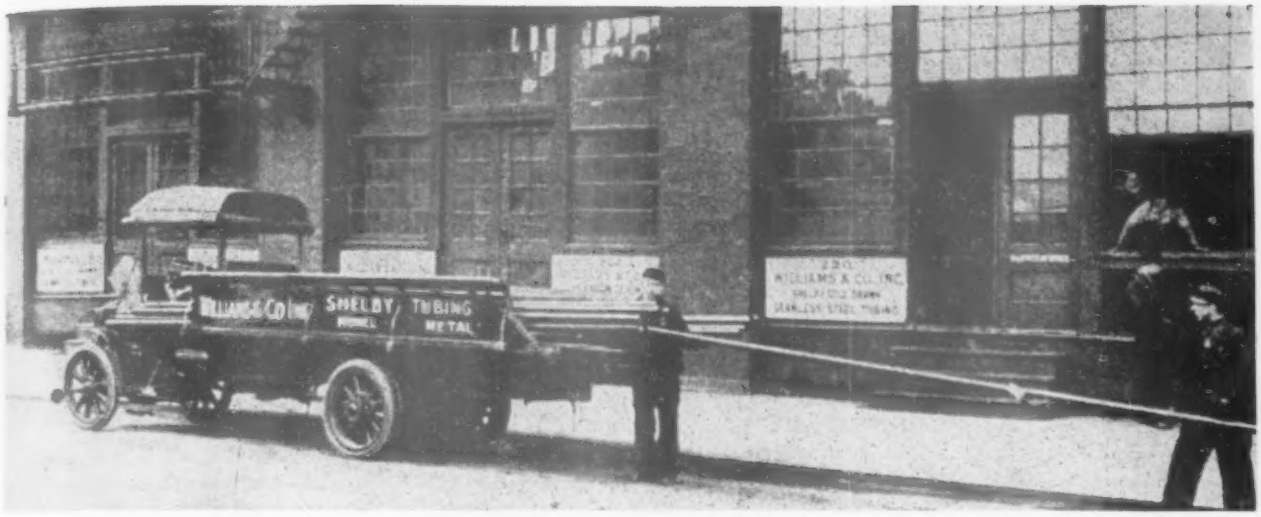
Forty years ago plants in the Pittsburgh industrial area found it hard to obtain special lengths of seamless steel tubing. The difficulty was noted by Harold E. Williams, who established a company that would supply steel tubing cut to any specified requirement. This concern started in business on June 15, 1907, under the name of Lees-Williams and Co. Mr. Lees (who parted with his interest in the business the following year) and Mr. Williams were the owners and sole working force. Their business had no warehouse and rented all of its transport. Only one product was handled.

Today the 40-year-old firm is exclusive warehouse distributor for a long and carefully selected list that includes seamless steel tubing, boiler tubes, aluminum, nickel, Monel, Inconel, brass, copper, bronze, stainless steel, manganese steel, refrigeration equipment, fire extinguishers, safety goods, welding wire and welding machines and supplies. For quite a few years now the annual volume of the welding department alone has been running well into seven figures.

From its original modest beginning, the company has grown until today it occupies five large warehouses and has a total personnel of about 350 employees. Mr. Williams is still president and in active charge of the business. Other officers are Hugh C. Armstrong and Charles Johnston. Mr. Johnston has served the company since 1915 as secretary and treasurer. Mr. Armstrong, who began as a desk salesman, acted as head of the nickel alloys department in the decade from 1932 to 1942 and is today vice-president and general manager.

Warehouse Cities

The present Pittsburgh warehouse at 901 Pennsylvania Ave. is located on the north bank of the Ohio river about a mile to the west of the celebrated spot where the Allegheny and Monongahela rivers come together to snip out the Golden Triangle of downtown Pittsburgh. Originally purchased in 1919, this headquarters warehouse has been considerably expanded until today it has a storage capacity of 100,000 square feet, about 20,000 square feet of which are devoted to welding products and supplies.



This combined office and warehouse at 220 Penn Avenue, Pittsburgh, was occupied from 1908 to 1916. Note the company's first truck, a Packard of the vintage of 1912

DISTRIBUTOR

ingredients which make a successful welding distributor of Williams and Co., Inc.

The company has established four other warehouses, all in Ohio, to provide strategic points for distribution over a territory that covers eastern Indiana, all of Ohio, Kentucky and West Virginia, western Pennsylvania and western Maryland. The Cleveland branch warehouse was established in 1927, the Cincinnati warehouse in 1928 and the Columbus facilities in 1939. Last link in the growing chain is the Toledo warehouse, which started operations in April, 1946.

It should not be supposed that the company's carefully studied expansion was always carried on without difficulties. "It was a rocky road sometimes," President Williams admitted in the *Post-Gazette* supplement. One of the biggest rocks was hit in 1931 when the Bank of Pittsburgh went under with $45,000 of Williams and Co. funds on deposit. "We had about $50 in the till," said Mr. Williams, "and a payroll coming up."

Hasty borrowing on a 60-day note enabled the company to meet its payroll. The loan was renewed once and then repaid by careful management. Later the Bank of Pittsburgh's receivers returned the total Williams deposit with interest—a repayment of approximately 105%. But it was tough going for a time.

The Welding Department

The company's welding department was organized in the autumn of 1924 as a part of the sales unit handling boiler tubes. It has grown to the point where it has swallowed up its parent, for boiler tubing is now one of the lines that is handled by the welding department.

Capable manager of welding sales is Robert C. Waldie, a veteran of 23 years' service with Williams and Co. Prior to becoming welding department head, Mr. Waldie was located in Cleveland, where he opened the company's first branch warehouse.

The welding department has no salesroom, as little walk-in business is done in comparison with the total sales volume. There is, however, large warehouse space, amply stocked with welding supplies.

Williams manufactures some of its own lines of gas welding rods and non-coated electrodes, straightening coiled wire as received from the mill and cutting it into standard electrode lengths. These rods are produced in standard diameters ranging from 3/32 to ¼ in. and are packaged in 50-lb packages under the Williams brand name. Wire as received from the mill is also re-coiled for automatic welding in coils of 14 to 22 in. ID. This wire is also sold in packages labeled with the Williams name.

Though welding rods and automatic welding wire represent the only direct manufacturing to be done, many other products are packaged, advertised and sold under the Williams name. In this category are safety gloves, safety clothing, goggles, cover lenses, welding helmets, anti-spatter compound and welding fluxes. Other products such as a-c and d-c welders, electrode holders and holder parts are distributed under the names of their manufacturers.

In addition to the items previously mentioned, the welding department distributes a wide variety of mild-steel, alloy and special-purpose elec-

Successful Welding Distributor Operations—5

The Cleveland warehouse is the company's oldest branch —original warehouse in this city was opened in 1927

The Cincinnati warehouse, now leased, will eventually be supplanted by a new Williams-owned building

trodes, silver-brazing alloys, welding cable, cable connectors, weld-cleaning tools, electrode carriers, welding booths, C-clamps, ground clamps, arc-oxygen electrode holders, welding hose and torch lighters.

Though the welding department takes orders for safety products, these items, in general, come under the safety department. This department is a comparatively recent offshoot of the welding department, being placed under its present manager, James L. Leighton, in 1942.

Sales and Service

Customers for the above welding and safety products are large industrial plants, steel mills, coal mines and metal fabricators in the western Pennsylvania, Ohio, West Virginia and Kentucky territory. Large and small, there are about 8,000 such concerns who must be sold the advantages of buying their welding supplies and equipment from Williams and Co.

There are many different ways in which such an ambitious sales task might be approached. Mr. Waldie uses that of service. The word "service," as he defines it, is not restricted in meaning to convenience in ordering welding supplies and equipment but includes actual down-to-brass-tacks assistance in the solution of specific welding problems. The nature of their work requires Mr. Waldie and his two inside assistants to know the answers on all phases of welding—and they do. He and his men are constantly available as telephone consultants and are able to straighten out many welding difficulties with a few minutes' conversation over the wire.

This, however, is only the beginning. To do a real service job, it is necessary to go into customers' plants and work with the men actually in charge of specific operations.

The Williams sales organization embraces two kinds of salesmen: general line men and specialists. General line men act as bird dogs and point out the game. The welding specialists bring down the bird, and then the general line men retrieve it.

General line men, as the name implies, handle the sales of every item in the company's complete line of products, of which welding supplies and equipment are only a part. There are five or six such salesmen in each of the company's warehouse territories—Pittsburgh, Cleveland, Cincinnati, Columbus, Toledo—as well as resident general line men located at Erie, Pa., Youngstown, Akron and Dayton, O., Louisville, Ky., and Huntington, West Va. In their regular calls, these men naturally learn about opportunities for the sale of welding equipment. Whenever the job gets too big for a general line man to handle, he calls in the welding specialist. The latter gets the big order and then turns the account back to the general line man to handle the routine reorders.

Territories of the specialists are naturally much larger than those of general line men. There are four of these welding experts in Pittsburgh, two in Cleveland, one in Columbus, two in Cincinnati and one in Youngstown, working in close cooperation with the general line men in their territories and also with similar specialty men representing the company's other departments.

Williams welding specialists are paid on a straight-salary basis and have an almost professional status. These men are most carefully selected. Each of them is required to have a thorough knowledge of all types of welding jobs, a knowledge derived from a background of broad experience. A specialist weldor—no matter how skilled he might be in a limited range of operations—could not qualify for one of these sales positions. A man with job-shop experience, dealing with different jobs, different metals and different processes, would be welcomed with open arms provided that he could meet Mr. Waldie's other exacting requirements.

Technical education is also highly desirable. The ideal combination, according to Sales Manager Waldie, is a metallurgist, an electrical engineer and a cracking good salesman—all rolled up in a single person. Some Williams men come very close to being this kind of triple-threat expert. One of them is a graduate metallurgist with several years at Battelle Memorial Institute, and another underwent an extensive scientific training at the research laboratories of a large electrical manufacturer. The rest of the welding specialists have had years of practical shop experience to qualify them.

Mr. Waldie asserts that he will back his men's specialized knowledge against that of any group of factory-trained manufacturers' representatives. Considering the present status of welding manufacturers' representatives in the field, that is very high praise, indeed.

A candidate selected for the Williams welding sales force is given

The Columbus warehouse was established in 1939 to provide better service to central Ohio

The branch office and warehouse at Toledo was added to the growing chain in April, 1946

a thorough on-the-job sales training. He goes out on calls with other welding specialists and with general line men for a period that may last as long as two or three months before he is assigned a territory of his own.

Williams specialists are on straight salaries because it is the company's primary objective to build a sales force that will deliver a genuine service to its customers, and it is felt that men on commission may not have this long-range viewpoint. In addition to their consulting services, however, the welding specialty men make regular sales calls and sometimes show a remarkable persistence in dealing with obstinate prospects. One salesman, for example, paid periodic visits to a plant for eleven years before he received as much as one small order for a single package of mild-steel electrodes. Today that concern is one of the company's best customers.

Manufacturers' sales experts really earn their salt when they come to Pittsburgh or other Williams warehouse cities. The visiting expert is immediately assigned to a welding man, who takes him to call on all of his hard-to-sell customers and prospects. The latter get a break, however, for their particular welding difficulties are thus given the personal attention of the top men in the field.

Printed Salesmanship

Since there are 8,000 names on the welding prospect list alone, between 15 and 20 thousand names on the company's general mailing list, it is obvious that direct mail and other forms of advertising must be used to supplement the activities of the salesmen. Salesmen, for example, could never announce a new product simultaneously to all prospects, yet that must sometimes be done to get all possible orders while the item is still "hot." A case in point is that of three successive Monday morning mailings on a new special nickel electrode for the welding of cast iron. This program was frankly an experiment, but the cumulative effect has justified its repetition on other items.

Because of the great volume of manufacturers' sales literature received, only the best pieces are selected for mailing to customers and prospects.

The company publishes its own catalog of welding supplies and accessories, revised whenever price changes justify. Latest edition is a 36-page, letterhead-size booklet that illustrates and describes over a hundred different items.

A large, complete stock of welding equipment and supplies, intelligently planned advertising and salesmen who are more welding consultants than salesmen—such is the Williams three-plank platform. And it has proved itself to be a most trustworthy foundation for a sales edifice.

WILLIAMS 40th Anniversary SECTION

Pittsburgh Post-Gazette

WILLIAMS 40th Anniversary SECTION

THURSDAY MORNING, JUNE 19, 1947

Williams and Company Marks Fortieth Anniversary of Founding in Pittsburgh

Pittsburgh Was Nation's Fifth City in 1907

One-Tenth of Nation's Freight Handled Here—Population Near 600,000, Still Growing

Williams' Rise Is Romantic Story

Founder's Story Is Story of Firm He Began in '97

Harold E. Williams, the founder and president of the [illegible] company, which began with [illegible] and now [illegible]

Workers Made Williams Firm Certain Success

Employees Entire 500 Times Number Now That 40 Years Ago

Warehouse Firm Has Grown From Small Beginning

New Products, Ohio Branches Added as Northside Concern Expands to Five-State Area

Company Grew Through Good Sales, Service

Excellent Salesmen Insured the Success Of Williams Concern

HAROLD E. WILLIAMS

Williams Has

Front page of the 16-page Williams 40th Anniversary Section of the Pittsburgh *Post-Gazette*. This supplement contained 115 news stories and 32 advertisements, all related in some manner to Williams and Co., Inc.

Silver Brazing

Silver brazing lends itself very well to mass production on continuous assembly lines. This California plant uses gas-air radiant burners to heat the alloy to brazing temperature.

Fig. 3 (above)—Brass strip for faucet case and case base is delivered in coils, palletized for convenience in handling with fork lift-trucks

Fig. 4 (right)—Case for the Model 502 is formed on this 350-ton hydraulic press. While the operator is forming the case, a worker on the other side of the press places the stamped parts in another die for trimming and punching on same press

STARTING February, 1946, in a 40,000-sq-ft building at Pasadena, Calif., the Commercial Division of the General Tire & Rubber Co. became the largest manufacturer of kitchen faucets in the United States within seven months. By late 1946 production was running at about 100,000 faucets per month, operating on a 40-hr production week. The 1947 schedule is about 150,000 per month.

A highly mechanized production system is employed and closely controlled with progressive inspections and tests. A large number of operations are tied together in a synchronous flow, and all of the other operations are at stations or machines as a part of the continuous process. The

Fig. 1—Model 502 ledge-type faucet (center) and its three principal subassemblies. Upper left shows components of the case; lower left those of the base. On the right are the elements that go to make up the swing spout

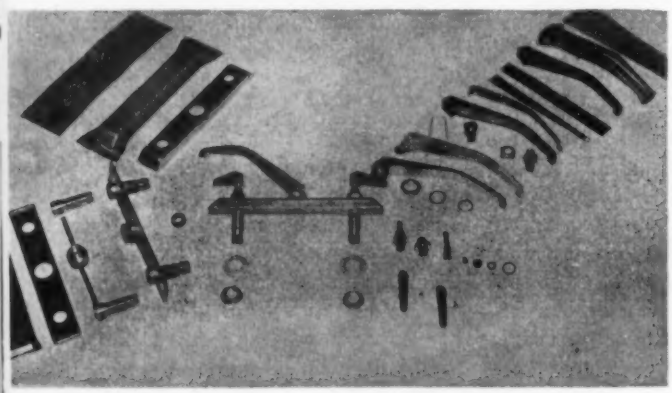


Fig. 2—The assembly parts and manufacturing progression of the Model 508 wall-type faucet. A completed faucet of this type appears at the upper left

Kitchen Faucets

★ PRODUCTION

BY FRED M. BURT

only breaks in the flow come from building up small banks of work-pieces between production operations.

While a variety of other products are manufactured, we are concerned here only with steps in the production of two types of swing-spout faucets: Model 502 ledge type (Fig. 1) and Model 508 wall type (Fig. 2). Both of these faucets are made from brass stampings and precision-machined brass fittings, which are subassembled and permanently silver brazed. The faucets are then sanded, buffed, polished and given a copper-nickel-chromium plating. A final inspection, rigid testing for leaks and jewelry polishing to a fine perfection of finish make the faucet ready for packaging and shipment.

Ledge-Type Faucets

As the production of the Model 502 ledge faucet involves more silver brazing and other operations, it will be used as the principal subject of this article. The case and the case base are made of brass strip of 16-gauge (0.050 in.) thickness, delivered in coils as shown in Fig. 3. To produce a case, the coils are mounted on a reel to feed the strip into a small foot-pedal-operated punch press that has a shear blade, a stop and a counter to record the number of pieces made.

The cut strips are quickly formed, trimmed and pierced in a 350-ton hydraulic press (Fig. 4), equipped with a double die and having two operators. The strips for the case base are similarly sheared and are then formed, trimmed and pierced on punch presses.

The raw material, rolls of brass strip and brass fittings manufactured outside are delivered palletized and are handled to storage or point-of-use by two fork lift-trucks.

In the first brazing line for the bases of Model 502, an assembly is made of the support bushing in the center, valve chambers on each end

Fig. 5—Staking the Model 502 case base into base subassembly. The wooden boxes on the conveyor line carry the assemblies to the brazing furnace

Fig. 6—After heating for 1½ minutes at 1,200 F, the brazed bases are removed from the eight-station furnace and placed on a crosswise rack, behind the operator. A conveyor carries them to cleaning baths and testing

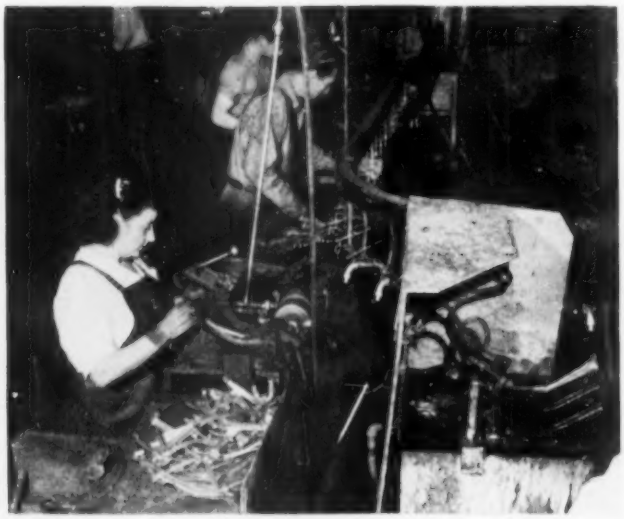


Fig 7—While the girl in the foreground stakes together the tops and throats of a Model 502 spout, the man next to her inserts preformed silver-alloy wire and the pivot bushing. The third operator is using an air-operated wiping die to tighten the spout prior to brazing

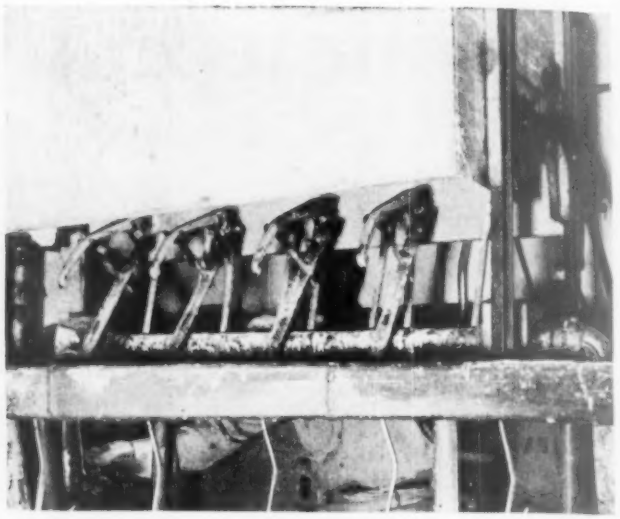


Fig. 8—One of the four brazing furnaces in which 502 spouts are brazed four at a time. Heat is applied by gas-air burners to melt the silver-alloy wire at large ends of the spouts. The handle the operator is just about to grasp lowers the hood while spouts are brazed

and two tubes running to the valve chambers from the support bushing. Little rings of 50% silver, 15½% copper, 16½% zinc and 18% cadmium are positioned around the four ends of the tubes, and a stop pin is inserted. This assembly is placed in a holding fixture. The case base is added and "staked" to the assembly by a blow with a manually operated ram (Fig. 5).

Fluxing the Bases

At the end of a roller conveyor, another operator paints on the flux at the areas of brazing jointure. The flux used on all brazing operations is a water-soluble fluoride paste that is thinned to the best consistency for a particular application. The alloy becomes fluid at 1,175 F, and the flux is also a low-temperature constituent. It begins to fuse at 800 F and starts to dissolve oxides immediately; at 1,100 F it becomes completely liquid and active, fully dissolving oxides and acting, also, as a cleaning agent.

After the flux is applied, each assembly is placed in a fixture which holds six bases, and the fixture is placed on the roller conveyor to travel by gravity to stations opposite the eight holding fixtures in the brazing line. Each station mounts three ceramic radiant-type burners fed by a natural-gas-air mixture under a pressure of 16 oz. The mixer and compressor unit receives the air and gas at virtually zero pressure and builds the mixture up to 2 psi pressure, which drops to 1 psi at the burners.

The blue flames bathe each of the localized areas where the silver-alloy rings are to be made fluid, and the alloy flows into and completely seals the circular interstices between the parts to be joined. As soon as the trained eye of the operator has determined that the brazing is completed (about 1½ minutes), he removes the bases with special hooks (Fig. 6). The empty cases are placed on a return roller conveyor to roll back to the end of the line for the next loading. The operator places each brazed unit on a table at the end of a nearby parallel line, where they are bathed in cleaning solution and water rinsed.

The brazed units are tested with high-pressure air for leakage at the joints. Those showing leakage go to the rework table, where little additions of silver alloy are made; they are then repainted with flux and go back for a second brazing.

The spout subassembly is made up of the spout top and the spout throat —pieces blanked, stamped, trimmed and pierced on punch presses. The staking indentations are also stamped in. After degreasing, the two parts of the spout are delivered to a girl, who places the throat in the top and stakes them together in a pneumatically operated machine (Fig. 7).

At the next station a preformed piece of silver-alloy wire shaped like an upside-down U is inserted in the larger end. Size, shape and exact position of the brazing wire have been calculated so that when the alloy becomes fluid it will flow along the edges of the two parts, brazing them tightly together. The pivot bushing is also inserted, along with a little ring of silver alloy to braze it. This bushing is made up of two parts, produced on automatic screw machines and swaged together.

In the next work station, the assembly is placed in a wiping or compression die in an air-operated machine which induces a tight fit around the pivot bushing. Then the units are placed on conveyor hangers. A little farther on, the conveyor dips down into a flux bath, completely coating the spout subassembly.

Brazing the Spouts

The spouts travel some distance farther on the line until they approach the four brazing furnaces, each of which has a capacity of four subassemblies (Fig. 8). The brazing operators work from the sides of the furnaces opposite the conveyor. Inside the conveyor line, a service operator removes the spouts from the conveyor and places them, four at a time, on the holding fixtures. Each furnace consists of a heavy steel hood, which fits over the gas-air burners to con-

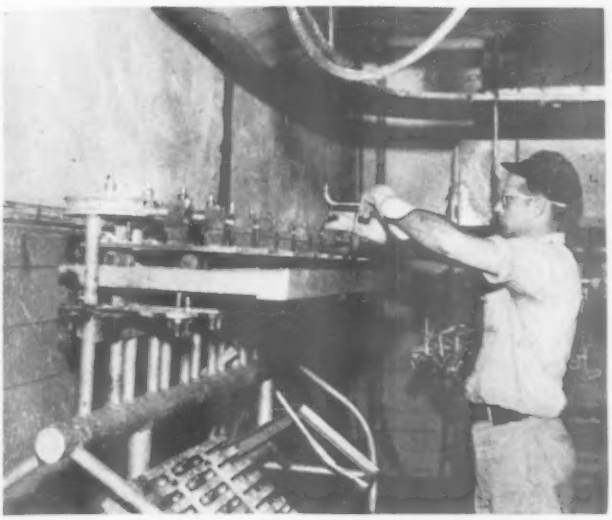


Fig. 9—Eight-station brazing unit for round spouts, Model 508, is charged by wheeled carriers. Burners are of the same type as those for the other spout furnaces, visible in the right background. The brazed spouts are hung on a conveyor that is located back of the operator

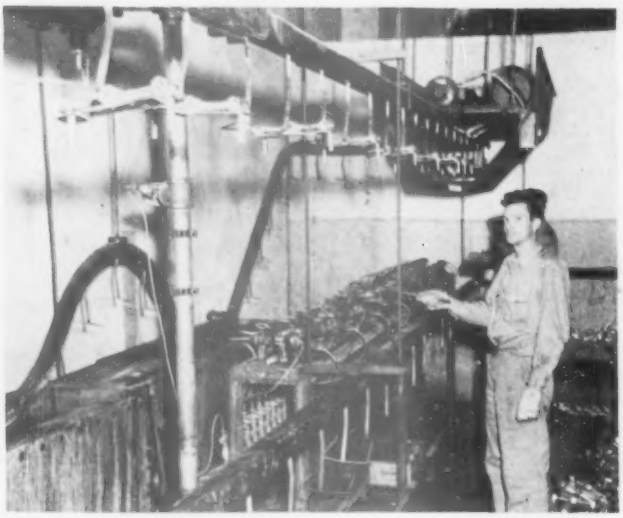


Fig. 10—Eight-station brazing unit for bases of Model 508 (wall-type) faucets. At each station, three radiant-type ceramic burners above and three below the work direct a concentrated heat of 1,200 F upon areas being brazed. Two operators can tend all eight stations

fine the heat during brazing. The hood is counterbalanced and operated up and down with a side lever. It is raised for loading and unloading.

The hot gas flames are projected from burners on each side of each spout to play evenly along the edges to be brazed together and on the pivot bushing. As soon as the operator determines that the brazing is completed, the hood is raised. This causes the heat intensity to be automatically reduced by an interlocking valve. The spouts are removed and replaced on conveyor hangers, which carry them around and down through three tanks for baths in sulphuric acid, a patented cleaning solution and a rinse in hot water.

Traveling a little farther, the spouts come to two testing units, located next to the starting point of their production line (see Fig. 7). Three spouts at a time are placed in holding fixtures and immersed in water while air pressure is applied to detect possible leaks. The defective units go to a rework table and are prepared for additional brazing.

Wall-Type Faucets

The round spout for wall-type Model 508 is assembled on a table located just past the wiping-die compression operation and parallel to the flux bath. Flux is painted on, and the brazing is done at an eight-station fixture (Fig. 9), using burners of the same type as the other spout furnaces. To charge the continuously operating furnace stations, the spouts are inserted in the front end of a small wheeled conveyor and pushed under the 1,200-F flames. The brazed spouts are carried by conveyor through the acid, cleaner and rinse baths and on to the testing station.

In a nearby area of 30 by 16 ft another continuous conveyor line is used to braze the bases for Model 508 faucets. Generally, the same assembly procedures described for the Model 502 bases are followed. Brazing is accomplished in an eight-station fixture (Fig. 10). Each station has three ceramic burners above and three below, producing a temperature of 1,200 F at the brazing areas. Two operators tend the eight stations. The brazed assemblies are carried by overhead conveyor through the acid, cleaner and rinse baths to testing.

Finishing Operations

After the Model 502 spout subassemblies have passed their hydrostatic test, the underside of the large end is machined. The throat of the spout is next ground down with a fiber grinding wheel, and the faucet goes to a belt sander for further rough polishing.

Before plating, all of the parts are rough sanded on belts containing a small amount of abrasive; they are then greased, buffed on cloth wheels and finally color-buffed with grease rouge or whiting.

Moving on into the plating department, the parts pass through a vapor degreaser. They are then placed on plating racks hung on a revolving transfer wheel and moved into position for handling into the different plating tanks. The plating sequence provides copper, nickel and chromium processing with extra cleaning and treatment of die-cast parts.

Final inspection, assembly, packing and shipping operations are also mechanized and use an overhead conveyor for ledge faucets and a belt conveyor for the wall model.

☆ ☆

Produce New Valve for Radiant Heating

Increased use of radiant heating has prompted Homestead Valve Mfg. Co., Inc., Coraopolis, Pa., to produce a combination balancing valve and air vent for such installations. The new "Radiantrol" is expected to reduce materially the installation cost of radiant systems by eliminating the additional piping, fittings and welding required for air vents. The valve can be used with pipe coils buried as deep as 8 in. below the concrete surface.

The valve disc is built into a wrought iron body, made of a short piece of pipe that has been end-beveled to facilitate welding into a section of the heating coil.

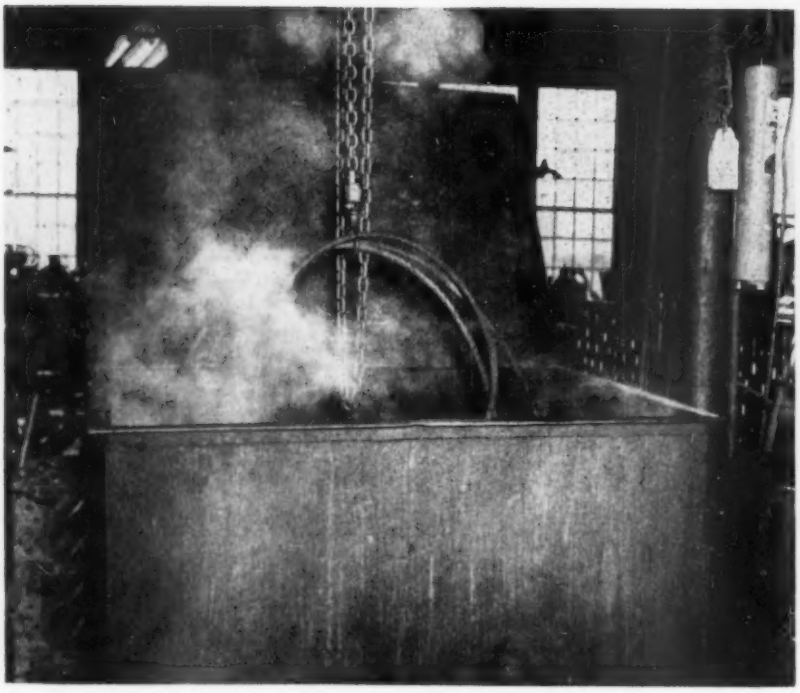


Fig. 2—Cleaning wire rope in the hot-solution cleaning tank. About one hour is required to clean the average 140-ft length of rope

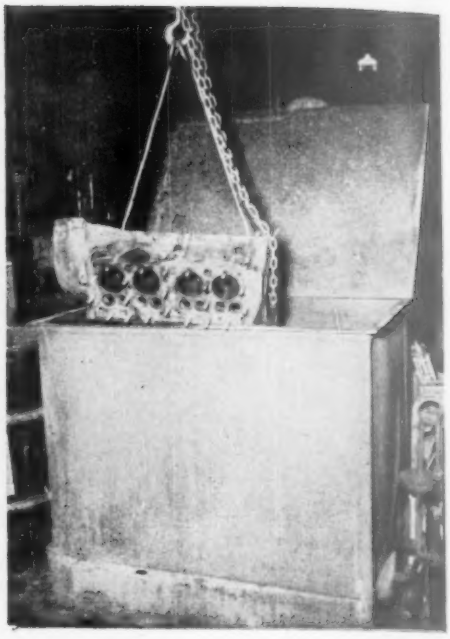


Fig. 3—The same tank can be used to clean a motor or other automobile part. Preweld cleaning has become routine

Welding Corrections

BECAUSE of the difficulty in obtaining proper replacement parts during recent years, a large part of our welding volume has been correction work. Much of this has been the building up of worn sheaves and drums which had caused premature damage to the wire rope. By proper correction and/or a change in size and type of wire rope, we are able to build a welded replacement which makes for better operation and longer rope life.

Building up Drum Surface

One example is provided by a cast-steel overhead crane drum of 24-in. diameter and 24-in. face. This drum had worn hollow in the center and the lagging was completely gone. The 7/8-in. wire ropes (steel center, non-preformed) used on this drum were lasting about one fifth of the normal safe life.

Without machining down, we built up the surface of the drum with a 1/8-in. coated electrode for welding cast iron. We used a 5/8-in. build-up in the hollow, tapering down to nil at the peaks. The drum was then put in a lathe and ground down to fit a 1-in. rope instead of the former 7/8-in. rope. Grinding was necessary because the surface was too hard to machine. This correction job took 16 man-hours of welding and 12 man-hours for grinding.

In the new rope installation, we used improved plow steel, wire center, preformed. We have found that for all work of this type, preformed wire rope more easily adjusts itself to the operation and gives a much longer safe rope life.

In six months of continuous operation after this correction, the drum face and lagging have shown no wear. Recent inspection of the preformed wire rope reveals no sign of wear and no broken surface wires.

Rebuilt Grooves

On small sheaves (16-in. wheel for example) where the groove is worn down, we take a 1/2-in. rod of soft steel and bend it to conform to the curvature of the groove bottom. We then fill in around this bar stock with weld metal (Fig. 1), using an E-6013 all-position a-c electrode. For the surface of the groove, we use a bead of hard-facing.

This rebuilding and correction method cuts welding time by two thirds. It also builds a groove which will outlast the straight rebuilt job by two to one.

Quite often on a dragline job, we find that, instead of a faulty sheave, the rope damage is being caused by a groove developed in the fair lead rollers. Here we use a 1/8-in. hard-facing electrode to build the new surface.

After the rebuilt groove has been machined or ground down to meet the wire rope requirement, we place the sheave in an operation frame, built for this purpose in the shop, and run it with an endless wire rope (preformed type) of the correct diameter.

On sheave groove work and drum face and lagging correction, we have found that the repaired part often outlasts a new one. We have also found that where preformed wire rope is used, a hard-facing build-up will result in a longer rope life.

It is a good policy, wherever possible, to make a machine operation

★ MAINTENANCE

Modern Machine Works, Inc., Sioux City, Iowa, employs six full-time weldors on such tasks as repairs to cable sheaves and drums and the lengthening of truck frames.

BY FAY PALMERTON

Co-owner and manager of the welding department, Modern Machine Works, Inc.

Fig. 1—Rebuilding the groove of a 16-in. sheave. A ½-in. steel rod is cold rolled around the bottom of the groove to form the base for a weld build-up with all-position steel electrodes

in a Job Shop

inspection and check before the welding correction. Bad alignment, for instance, may be causing the trouble; unless this is also corrected, no amount of groove rebuilding will change the situation. Often it is the bushing that is causing the excessive rope wear by either letting the rope rub on the sheave carrier or by forcing it to rub a second groove.

Cleaning Wire Ropes

We have made it a policy to clean all parts before they are welded. This saves welding time and allows the weldor to make a better prewelding inspection.

Cleaning and proper lubrication are two things about which most users of wire rope should know more. It is my belief that fully 50% of all rope failures are due to the lack of lubrication or to using improper lubricants.

Before a wire rope is returned to a machine on which a drum or sheave correction has been made, that rope should be thoroughly cleaned and given a hot-bath lubrication with factory-recommended lubricants.

Fig. 2 shows our hot-solution tank for cleaning wire ropes. The same tank can also be used to clean motors (Fig. 3). We use a commercial hot cleaning compound and follow factory recommendations on solution mix. The tank is cleaned and the mix changed each six days. An inside steam coil holds the cleaning solution to a boiling-point temperature.

About an hour in the hot-solution tank is all that is needed for thorough cleaning of wire rope, a motor, an auto rear end part or a wire basket of smaller parts.

When a rope has been cleaned in the hot tank, it is removed to the drain rack and washed by means of a pressure hose. This hot hose rinsing takes approximately 10 minutes for the average 140-ft length of wire rope.

Formerly, we had a cold-solution cleaning tank. We used a commercial cleaning compound which cost us around $2 per gallon, and it required 150 gallons to fill the tank. Without change, a tankful of solution would last us an average of six months. Figured conservatively, therefore, cleaning with a cold-solution tank cost us between $500 and $600 per year.

Hot-Solution Costs

The compound for our hot-solution tank costs us 12½c per lb, and it takes 6 oz of the compound to 1 gallon of water. Because of the boiling temperature, a tank of small capacity is used. One fill of the hot solution costs us around $12 or about $624 per year, allowing one change of the tank for each six days of operation. This looks as though hot cleaning was slightly more expensive, but the full story has not yet been told.

The cold-solution type of tank requires at least 12 hours to clean the average part or a 140-ft section of wire rope. After being cleaned, the part must be allowed to drain back into the tank for at least another hour. Finally, it must be rinsed with a pressure hose.

In the hot-solution tank, the maximum cleaning time is one hour, and no time is needed for draining. At approximately the same yearly operation cost, therefore, we can turn out from ten to twelve times as much work with a hot tank as we would be able to do with a cold-solution set-up. Also, the hot-solution tank turns out a better job of cleaning, particularly with wire rope having a wire center.

It would be impossible for us to handle some of our welding work if a 12-hr cleaning time was required before the welding could be done.

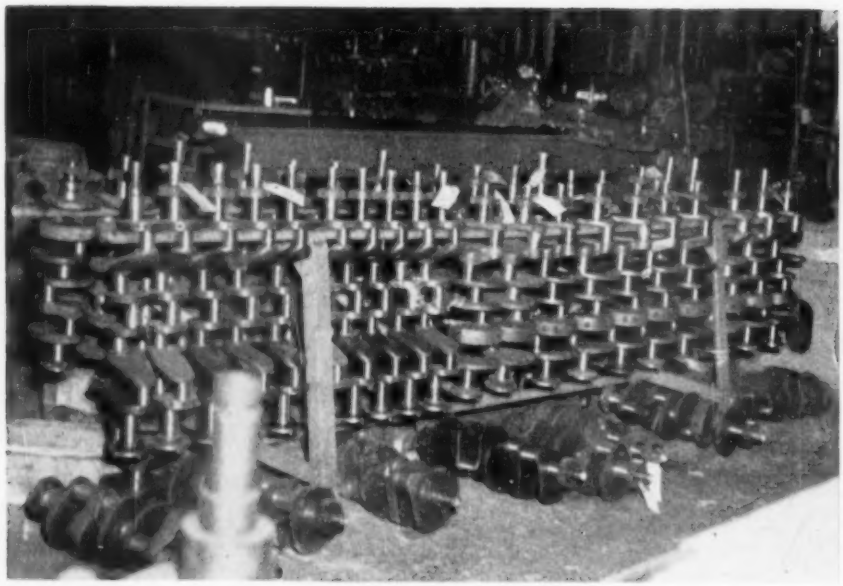


Fig. 5—Some of the crankshafts turned out at Modern Machine Works, Inc.

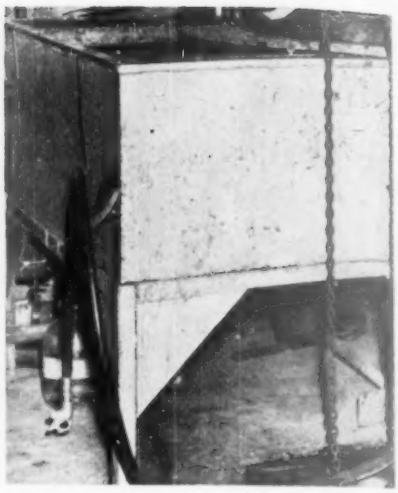


Fig. 4—This tank was designed to test radiator repairs. Note the circular wooden platform on which the radiator is being lowered

This is particularly true of sheave grooves, drum lagging and similar corrections. In these cases, the inspection is made, the part is brought in, cleaned, welded, the wire rope is cleaned and relubricated, and the machine is back in operation in less time than would be required for a cold-solution cleaning.

Testing Radiators

The testing of repaired auto radiators has always presented a bogie to job shops. A water tank in which the radiator can be lowered below the water level (see Fig. 4) pretty well solves this problem for us. After the repair has been made, the radiator is placed on a wooden support disc which can be lowered down into the tank by an overhead wire rope hoist. All openings are plugged, and the air line is attached. Since the entire radiator is covered by water, the operator can quickly and easily check the job.

The total cost of construction on such a tank need not run over $75; it will save many times this amount each month if even an average-to-small volume of radiator repair is handled.

In addition to repairing sheaves, drums, wire rope and radiators, we do a large amount of crank-shaft and motor rebuilding. Fig. 5 shows some of the crankshafts this department turns out.

Fig. 6—This weldor is lengthening a truck frame by welding inserts to it. The frame inserts are purchased in widths of 7, 8 or 9 in., as needed to provide the number of inches that are ordered to be added to the frame

Truck Frame Lengthening

Our welding department employs six full-time weldors. Approximately 60% of our present welding volume comes from truck frame lengthening work (Fig. 6).

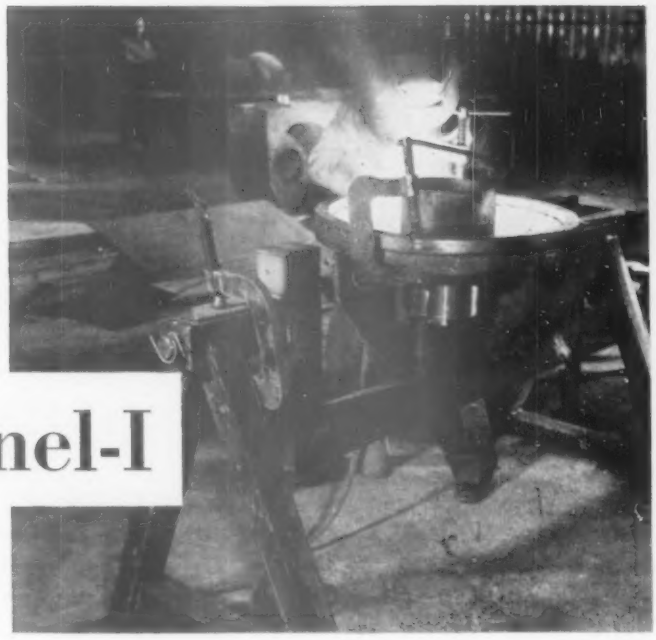
Truck operations may require the frame from a 154-in. wheelbase to be lengthened to, say, 187 or 190 in. Most of this new length is added in widths of 7, 8 or 9 in. We buy frame inserts in these widths to give the required addition. In the case of the frame lengthened from 154 to 187 in., 33 in. of inserts are necessary or three 8-in. inserts and one 9-in. We flame-cut the frame in the proper places and weld in the four inserts, using all-position a-c electrodes of the E-6013 class. Both outsides of the frame are fishplated to complete the job.

The job of lengthening a 154-in. wheel base to 187 in. requires approximately 16 man-hours. This type of correction costs from $125 to $150 for the average job.

Frame lengthening is proving very satisfactory to truck operators who are not able to get new replacements. We have also done considerable work of this kind in cases where new trucks have been purchased and the old truck needs to be lengthened and rebuilt for secondary duty of a different type.

★ TRAINING

Education for Welding Personnel-I



BY WALTER J. BROOKING
Dean, LeTourneau Technical Institute of Texas, Longview, Tex.

LeTourneau Technical Institute has established a highly effective plan for the training of welding engineers and production specialists. It combines classroom instruction, on the college level, with paid part-time employment.

THE extent to which welding is utilized in the manufacture of machinery, equipment and metallic products is attested to by the millions of dollars spent each year in the welding factories, manufacturing plants and welding establishments which are to be found in all of the industrialized sections of the country. The importance and economic advantage inherent in this modern method of fabrication are likewise indicated by the increase in the number of manufacturing organizations using welding as the major method of producing their goods, and the large number of welderies whose business is the repair or maintenance of modern machinery and structures or the manufacture of parts for machine and equipment builders.

One essential element which is common to all of these welding establishments is a trained and capable personnel to supervise, direct and engineer production. The men who do this job are a part of the large and important group of professional industrial scientists and managers in modern industry, whose duties embrace the functional control and operation of the nation's production machinery. These men are variously known as the welding engineer, the superintendent of the welding department, the welding foreman, welding production manager, welding methods engineer or engineer in charge of welding design and production.

(Headpiece) Production welding, using setting-up and positioning fixtures on real work, provides practical training for the welding engineering student at LeTourneau Tech

Whatever may be his title, the man at the head of the welded production department (and in varying degrees all of his assistants) must have certain characteristics of background, experience, education and capability.

Mostly Self-Educated

Among the characteristics which he exhibits are:

1. He is a capable and experienced welding mechanic who knows the practical side of welding production. Usually he has learned it from the beginning as a welding operator, through several years of experience.

2. He has acquired a working knowledge of the technical information associated with welded production. This has been learned through study on the job, by correspondence courses, by reading trade literature or by formal school study.

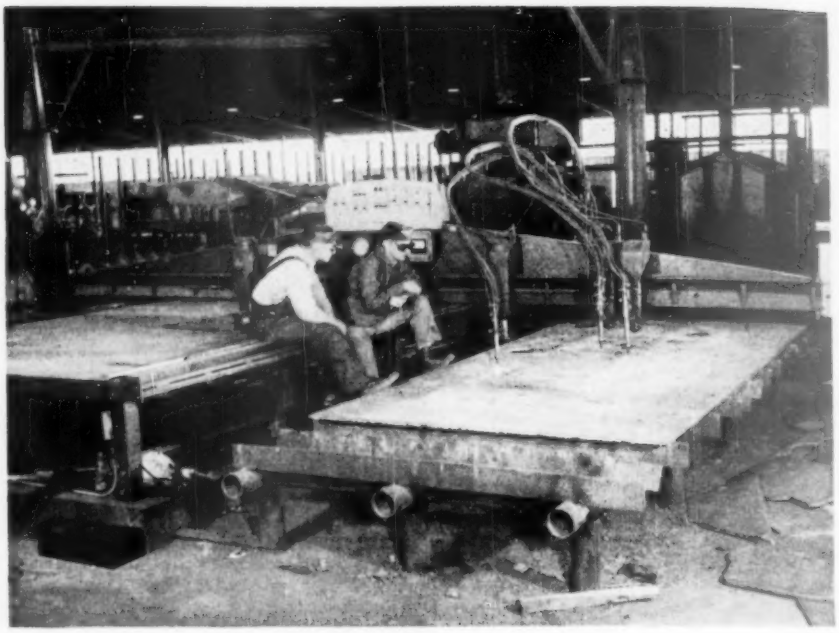
3. He has also learned the basic principals of the economic factors associated with welding and takes advantage, to the extent of his knowledge and the facilities available to him, of the favorable economic factors in welded manufacture.

4. He has some understanding of welded design, tooling for welded production and a general knowledge of mass-production principles, acquired through experience, personal resourcefulness and study of his work.

5. He has not attained his position by virtue of a well planned and orderly formal education as a welding engineer* or welding specialist.

*Ohio State University several years ago established the first curriculum leading to a degree in Welding Engineering. It is to be hoped that other universities will copy this progressive plan.

Full-time instructors work with the student to correct his errors and give basic information. Correct procedures with measured current and operational control provide a sound basis for learning



Study of flame-cutting on production projects enables the student to understand the meaning of good scientific practice and careful workmanship

A Co-operative Program

Because of the important role which welded production now plays and will increasingly play in modern America's production, and because of the need for a better method of training capable welding mechanics, engineers and managers, the LeTourneau Technical Institute of Texas, working with the R. G. LeTourneau Corporation's large new manufacturing plant at Longview, Texas, has established an original plan for the training of welding engineers and production specialists.

A full-time staff of six welding instructors is now employed, not counting the instructors in metallurgy, chemistry, physics and other allied subjects. It is anticipated that double or three times the present number of students will eventually be enrolled in welding engineering, necessitating employment of a large staff of welding instructors and specialists.

The LeTourneau Technical Institute of Texas works closely with the R. G. LeTourneau Corporation to provide a coöperative educational program designed to correlate with formal technical education the elements of study and experience which have contributed to the success of welding production specialists. The program is thus more orderly and, from the standpoint of elapsed time, more efficient than the manner by which most such men obtain their education.

Basically, the LeTourneau Technical Institute's plan is to provide an orderly classroom study on the college level of the science and theory of and associated information on welding. The class-room instruction occupies a half of each student's school day, and the other half is taken up with actual work experience as a welding operator and mechanic in the nearby LeTourneau plant under the guidance of a full-time Institute instructor.

Earn While They Learn

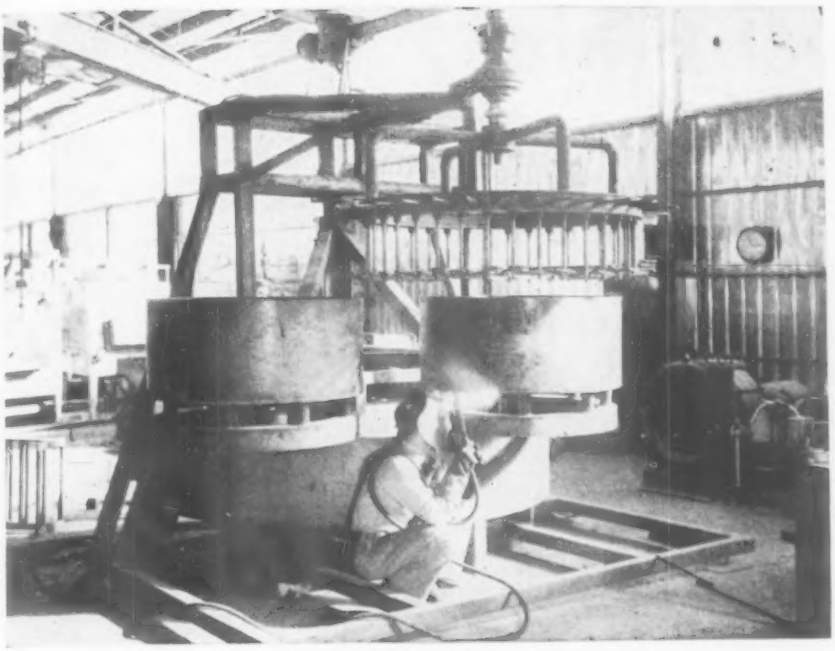
To increase the value and reality of his study, the student is paid by the company at a rate commensurate with his skill as a beginner. His rate of pay is progressively increased as long as he is a part-time employee studying applied welding science as a part of his Institute curriculum in welding engineering.

The LeTourneau Corporation's new Longview, Tex., factory thus serves as an educational laboratory. This plant was built to produce a line of arc-welded heavy earth-moving equipment and concrete house-building forms. It is an all-welded steel and aluminum building, 310 feet wide by 1,000 feet long. The entire Longview plant was erected and fabricated by arc welding. To a large extent, the equipments for storage, transportation and handling are designed on the spot and fabricated in the plant. Production jigs, fixtures and tooling for the fabrication of the plant's main products are also a part of the work, even to the extent of building semiautomatic lathes for the production of finished welded machine elements. It would thus be hard to imagine a better laboratory.

The student commences his work in the factory with three weeks of vestibule training. During the first few months of his training, he devotes the larger portion of his factory time to serving as a welding operator.

As soon as he becomes sufficiently adept at metal deposition, he is allowed to set up his own work under the guidance of an instructor. This enables him to begin to understand the importance of such factors as fit-up, manipulation of jigs and fixtures, the effects of distortion, etc. He is also given an overall opportunity to observe the tooling, planning and production being done around him in the factory.

Basic information is provided continuously as a part of his factory training, which differs from the usual apprenticeship system in that he has a full-time instructor to point out various elements which are normally less clearly defined to the usual apprentice or plant workman.



The student welding this specially built unit for flame-hardening on a production basis learns while doing something useful—and gets paid for it

The combined part-time employment and instruction time spent in the LeTourneau Company's factory gives the student actual experience with pay for the hours spent and also provides five semester-hours of school work per eighteen-week semester.

Advantages to the Student

As far as the student is concerned, the plan presents certain fundamental advantages:

1. The production machinery used in this large manufacturing plant, including some 400 welding machines of various types and over 350 machine tools, provides a variety of working facilities and equipment which far exceeds that possible in vocational school laboratories. The variety in size of machine tools from sensitive drills to $50,000 boring mills, and the variety of work done, present the student with an almost ideal situation for learning.

2. The laboratory work is an actual employment experience in which the student is working on genuine productive work, the results of which he can see as useful and contributing to a definite production program. It is not preplanned laboratory exercises, the "make-work" aspects of which often reduce the incentive.

3. The student's laboratory time may be used as a credential when he seeks employment. This is a very real advantage to him because the company's employment records show him as a part-time employee and thereby strengthen his position when he applies for full-time employment.

4. The part-time employment is in work which is the same as his major educational objective, unlike those engineering students forced to work at soda fountains or cafeterias, wait on tables, etc.

5. This plan provides a liberal degree of timely industrial employment experience while the students are in the plant. While they are under the full-time guidance of a trained instructor whose function is to teach, they are also under the supervision of an industrial foreman, coöperating with the instructor, whose function is the assignment of work. His influence provides experience in the employer-employee relationship which exists in industrial establishments.

6. The pay given the student for the time spent in the laboratory allows him to pay part of his expenses while he is educating himself.

Factory and Classroom

The work which the student does in the plant is assigned on the basis of his major interest (machining, welding, mechanical maintenance, etc.). The length of time which he spends on each individual assignment in the shop depends upon the educational value of the work he does, in the light of a realistic evaluation of industrial experience.

The work which is done in the classroom during the other half of the same day includes subjects related and supplemented to his major work. It comprises courses in language, mathematics, mechanical drawing, metallurgy and other subjects applicable to the work he does in the plant. Citizenship and government, physiology and hygiene are taught to academy level students on practically the same basis as in a public high school with a vocational course and are presented on the institute or college level as they would be taught in a college classroom or laboratory program.

The course of factory experience and classroom instruction is comprehensive enough to give the student the abstract tools of language, mathematics and technical science to provide from 27 to 36 months, or the equivalent of three to four years of school work.

The LeTourneau Technical Institute course of instruction has already received college level recognition by the Texas State Department of Education and the American Association of Junior Colleges.

In his concluding installment, to be published next month, Mr. Brooking will discuss the underlying educational philosophy of this plan of education and will give details of the welding engineering curriculum.—The Editors.

☆ ☆

Westinghouse Produces Film on R-F Heating

Principles and industrial applications of radio-frequency heating are portrayed in a new 16-mm sound-motion picture filmed for Westinghouse Electric Corp. Part one of the two-part production explains the theory of induction heating and illustrates its uses for soldering, brazing, annealing, and hardening. The second section, dealing with dielectric heating, shows such applications as the preheating of plastic preforms, bonding of laminates and plywood, textile drying and twist setting, curing and drying of rubber, etc.

This 40-minute movie is available without charge from the film section of Westinghouse Electric Corp., 511 Wood St., Box 868, Pittsburgh 30.

Welded Steel Frame for Iron Works

★ CONSTRUCTION

BY K. A. MOUSSEAU
Welding Engineer and Supervisor, Crown Iron Works Co., Minneapolis

Framework for the new Crown Iron Works Co. building was erected in 300 man-hours by arc welding structural steel.

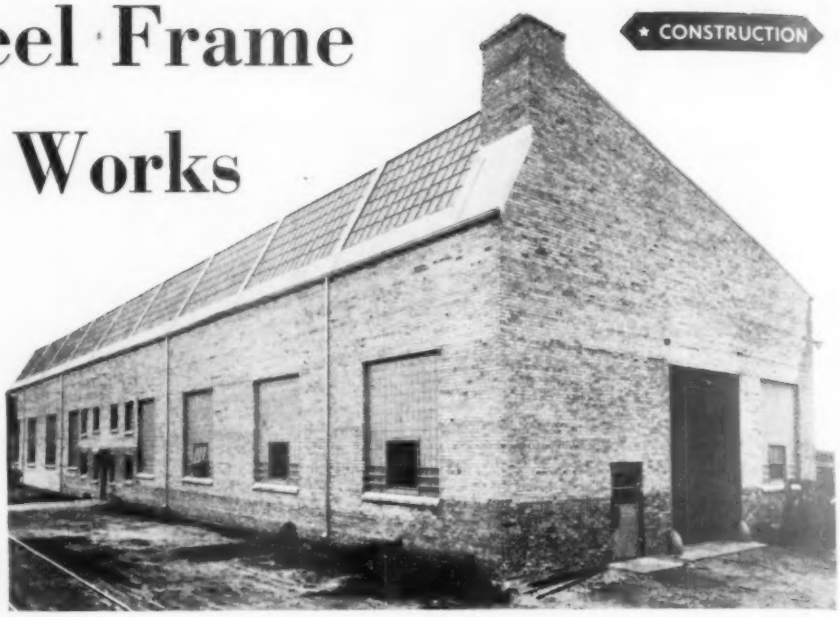


Fig. 1—Exterior of new Crown Iron Works building at Minneapolis. The steel framework was built of prefabricated members welded prior to erection

UTILIZING odds and ends of structural steel for materials, Crown Iron Works Co., Minneapolis, recently completed an all-welded steel building (Fig. 1) of approximately 7,500 square feet to house its commercial storage facilities, blacksmith shop and automatic-welding equipment (Fig. 2). The building is 179 ft 1½ in. long, 50 ft 4 in. wide and 39 ft 6 in. high at the highest point.

MEMBERS PREFABRICATED

The new building was designed in such a manner that additions can be made with a minimum of ease, time and transition. The frame (Fig. 3) was erected in 300 man-hours and is of all-welded prefabricated design. The prefabricated members were assembly-welded prior to erection through the aid of a truck crane, which turned them over for welding. When the frame sections were completed, they were moved to the building site, and erection of the building began.

The walls are of 13-in. brick, except for the east wall (as shown in the close-up view at the right in Fig. 4), which is of 12-in. concrete block. This measure was taken with a view of future additions.

The lower windows are of directional glass blocks, which screen and protect the workers' eyes. Infrared-resistant wire-reinforced glass in the skylight allows a greater diffusion of light in the plant and protection from injurious rays.

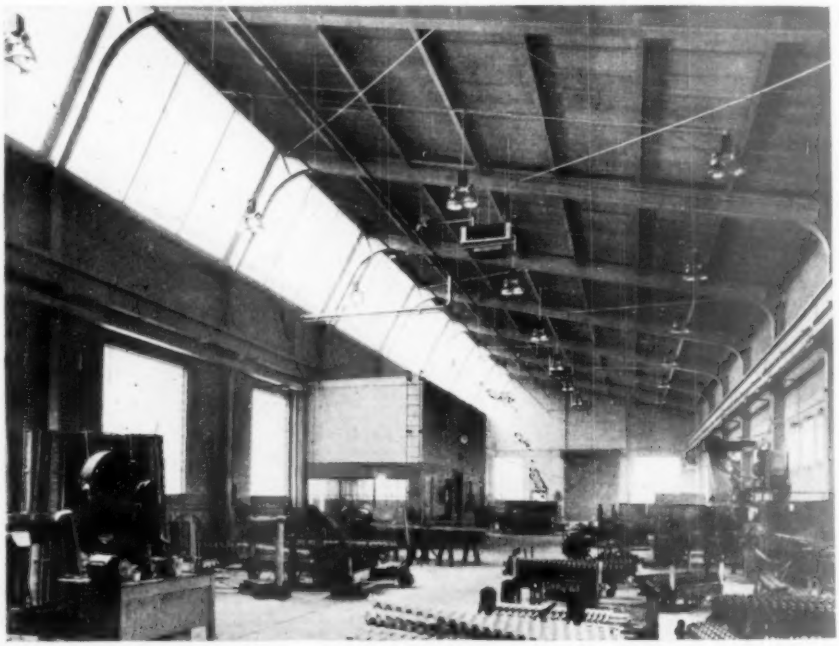
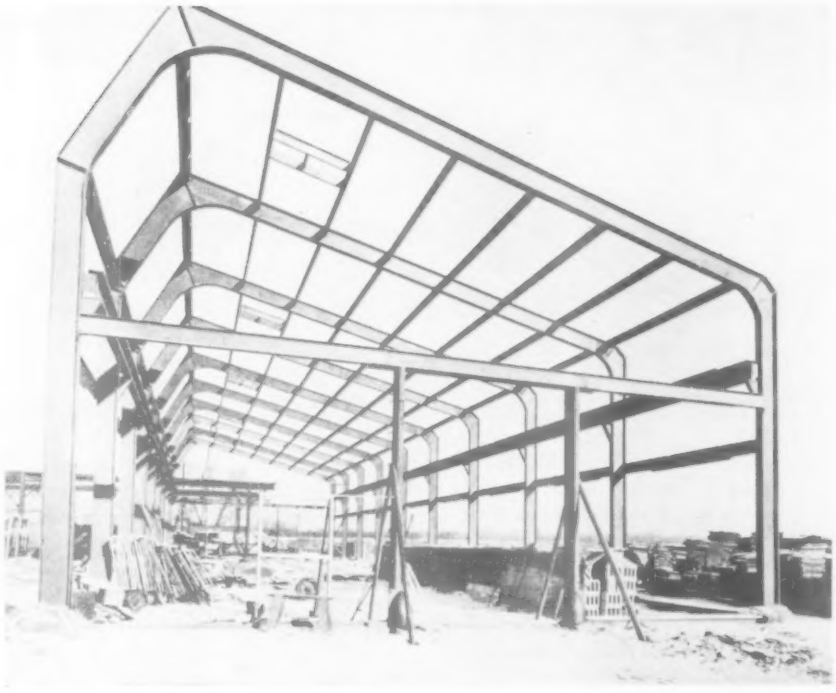


Fig. 2—Interior of the new building showing the lighting and placement of production equipment, including equipment for automatic arc welding

Fabrication of the building was accomplished during a slack period so that the diversion of manpower from factory production to construction would carry many employees on in continued employment and preclude the necessity of layoffs and interdepartment transfers of workers.

BEAM SIZES VARY

It is interesting to note that seven sizes of beams were used in the structure. The rigid frames are of 18-in., 85-lb wide-flange beams all around the arch. The purlins are 10-in., 15-lb I-beams, spaced 6 ft center-to-center to receive precast lightweight con-



joints, portions of the web were cut out and 5/8-in. butt plates were inserted. The legs were bent around until the webs were flush against the butt plates, and fillet welds were run around the plates in two passes.

The bracket seats for the crane girders were fabricated of 3/8-in web plate, 1/4-in. seat plate and of 3/8-in. flange plate bent to shape.

The necessary force to bend the knees around into shape and to "peel out" the lower flanges at curved undersides of the knees was attained by combining the pulling force of the overhead crane with the force of hydraulic jacks.

The materials shortage might have created insurmountable delays, but utilization of odds and ends kept construction rolling. An example is the arc welding of odd pieces of column to form a structural member (left front in Fig. 3).

crete roof slabs. The crane beams are 18-in., 47-lb wide-flange beams, reinforced laterally with a 10-in., 15.3-lb channel arc welded to the top of the flange. A 40-lb ARA rail is used for the 5-ton crane operating on these girders.

Ridge struts and eave struts, of 12-in., 28-lb wide-flange beams, were fitted with plates bent in such a manner as to form the head and sill members of the steel skylight windows. Jamb bars were welded to portions of the rigid frames between windows to receive window jambs at these points. The 12-in., 28-lb wide-flange tie beam used at the window height served the triple purpose of a column-to-column tie, lintels and support for the brickwork over 15 ft high, as called for in local building codes in Minneapolis.

The frame of the structure rests on reinforced concrete footers. The horizontal strains on the bases of the columns are taken up by two 3/4-in. round rods, tied transversely across the building from column to column. These rods are embedded in the 6-ft concrete floor slabs and are bent downward and tied into the column footers.

The joints in the 18-in., 28-lb wide-flange beams were prepared for arc welding by scarfing one side of the web and the outer sides of both flanges to a 50-deg bevel. A 1/8-in. root opening was used. Four welding passes were made on the webs on the scarfed side; then the opposite root was chipped clean to about a 1/8-in. depth. A similar procedure was employed on the flanges, but nine passes were made on the scarfed side.

Fig. 3 (above)—Overall view of all-welded framework. The beam at the left front was fabricated by welding together several odd pieces of column

Fig. 4 (right)—Close-up of welded structural design showing column and beam connections

Photos courtesy The Lincoln Electric Co.

Joints Changing Direction

At points in the bents changing direction, such as in the three-knee

Foremen to Convene in Los Angeles, Sept. 18-20

More than 12,000 American management men are expected to attend the 24th annual convention of the National Association of Foremen, to be held in Los Angeles, September 18, 19 and 20.

Foremen and department supervisors, senior executives and directors, will meet together in 100 panel discussion groups.

★ PRODUCTION

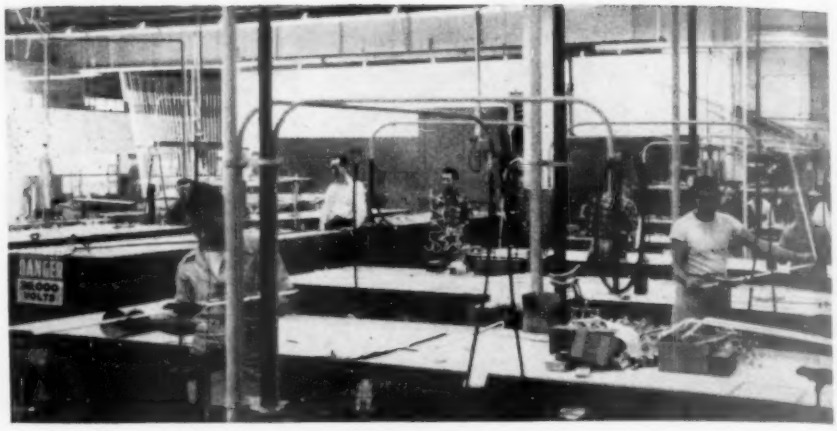


Fig. 1—Partial view of glass department, Electrical Products Consolidated, Seattle, showing tube bending and welding tables and bombarding table (left). Cross-fire burners are used in welding; ribbon fire in long bends

WELDED Glass Signs

Glass tubing can be bent and welded even as metal tubing. Although this article is a bit off the beaten track, we think that our readers will find it interesting.

BY M. G. HAWKINS

A PROCESS for the welding of glass tubing is indispensable to the manufacture of neon signs by Electrical Products Consolidated, Seattle, Wash. This company, which specializes in made-to-order electrical advertising media, has perfected its methods to such an extent that the largest sign can be completed in four days from customer's order to delivery.

Cross-fire burners (Fig. 1) and hand torches (Fig. 2) are employed to weld the glass tubing. The cross-fire is used in the welding of tube sections, and the hand torch is applied to weld (seal) the electrodes to the bent tubing.

Gas-Air Burners Employed

Each burner is controlled at a particular temperature determined by the tube diameter and also the type and color of glass. The fuel is manufactured city gas, mixed with air through a gas booster to give greater heat to the flames. Air pressure is 5 to 6 times that of the gas, with volume at low pressure the controlling factor.

Great care must be taken to prevent neon tubing from darkening, a mishap that occurs if too high heat is applied. When a burner is properly adjusted, the flame has no chemical effect upon the glass. A slight degree of oxidation may occur, however, if there is too large a proportion of gas in the gas-air mixture.

Excessive heating of fluorescent tubing or too long a wait before welding will cause injury to the fluorescent salts lining the inner walls.

Lead glass is used exclusively for conventional neon tubing because of its property of softening for bending at 330 F. This tubing is furnished by the Corning Glass Works under the trade name "GI." It is usually in 4-ft. lengths and is designated by the OD. The ID, however, is extremely important to the efficiency of the tube and to its apparent brilliancy.

Electrical Products Consolidated has also developed the Kirsten "Hi-Tensity" tubing, a hot-cathode fluorescent tubing which gives light from 20 to 35 times the brilliance of conventional neon tubing. For this service, "Nonex," a hard heat-resisting glass is employed. It has practically the same characteristics as the well-known Pyrex but is less difficult to manipulate.

Start with Template

The design is drawn in reverse on a template, allowance for welds and electrode connections being made on the back. The tubing is then heated and bent and welded as necessary to fit the template. In doing this work, routine glass-blowing methods are used (Fig. 3) as a precaution to keep the walls of uniform thickness to avoid strains and eliminate any constriction which might obstruct the flow of light through the tube.

While the glass is being welded, it is kept in constant rotation in order to assure a uniform heat distribution. A large and unwieldy unit of tubing must be supported and handled with great care during the welding and bending operations.

Stationary color effects in the fluorescent tubing are obtained by welding different colors of tubing into one continuous length. The colors which can be thus welded are: canary, blue, white, tangerine and rose. The introduction of mercury vapor in red tubing destroys the red, turning it into blue. Only an off-and-on effect can be created with this type of tubing. Non-fluorescent tubing is necessary where animation is planned. Each letter must have a complete outline of tubing for each color desired.

When the desired design has been created, it is matched with the template (Fig. 4) for assurance of accu-

Fig. 2—Hand burners or torches, applied to the work directly, are used to seal electrodes to the tubing ends

Fig. 3—Glass-blowing methods are used to insure walls of uniform thickness while the tubing is being shaped

Fig. 4—Matching shaped tubing to the template for assurance of accuracy

racy, and a "tubulation" is attached for pumping. The tubulation, a small-bore glass from 4 to 6 in. long, is welded with a hand torch at right angles to the tube. It is placed at the rear, where it will be hidden when the tube is mounted. If mercury vapor is to be introduced in the tube, a small trap to contain the mercury is made a part of the tubulation.

Welding the Electrodes

The next step is to seal on the electrodes (Fig. 2). One end of the tube is corked while the electrode is welded to the opposite end; the cork is then removed, and the second electrode welded in its position. The glass worker attaches a hose to the tubulation to provide an air pressure sufficient to keep the tube from collapsing while the electrodes are being welded.

The tubulation is now used to attach the formed unit to the pumping system. All air is evacuated from the tubing, and impurities are drawn out from the inside of the tube and out of the glass and the electrodes. Upon completion of pumping, the tube is tested with a Tesla spark coil to determine whether or not any gas remains. If this test is satisfactory, a small amount of inert gas is fed in under pressure (usually about one tenth of an atmosphere).

After the gas has been introduced, the tube is sealed off behind the mercury trap and tested for leakage on the "Epcon" table (Fig. 1), an ingenious piece of equipment invented by company engineers for testing tubes. If the results of this high-voltage test are satisfactory, the tube is burned for a period of time as a further test.

A neon or helium tube is complete at this stage. An argon-krypton tube, however, must have a small amount of mercury dumped into the mercury trap, which is then sealed off.

Making the Cabinet

The glass letters must be mounted upon a supporting metal cabinet. The formed 24-gauge sheets are sent to the assembly bench to receive channels, stiffeners and other necessary fittings. Galvanized angle-iron frames are added for rigidity and to provide support for erection. A standing seam is used to join the sheets. Because of the high voltage required by the luminous tubes, every safety precaution is incorporated in the wiring.

Paint spraying methods are used to finish the sheet-metal cabinet. First, the entire cabinet is painted a background color of the lightest color used in the design. After a drying time of approximately four hours, the outline of the reading matter, borders, etc. is transferred to the face by means of a pounce. The area outlined by the dust pattern is protected from further spray coats with masking mud. This method of protecting a desired color is followed with each color addition. The stripping of the letters is done by hand.

After drying for 12 hours, the bulky cabinet is fitted with 1¾-in. glass hooks to serve as tube supports. These are spaced at 12-in. intervals and follow the outline for the illumination of the advertising. Two hooks are placed as near as possible to each electrode to absorb the shock at these points. Finally, the tubing is mounted on the cabinet and given a final operating test.

Five Plants for Signs

Electrical Products Consolidated is one of the largest sign companies in the United States, having manufacturing facilities and plants in Seattle and Spokane, Wash., Denver, Colo., Great Falls, Mont., and Salt Lake City, Utah, as well as maintenance and tube plants at Tacoma, Bellingham and Yakima, Wash., Boise, Idaho, and Pueblo, Colo. The Seattle plant alone has developed into a $2,500,000 annual business. Through its association with the Electrical Products Corp. of California, the company has the facilities of what is said to be the most complete research laboratory in the sign industry.

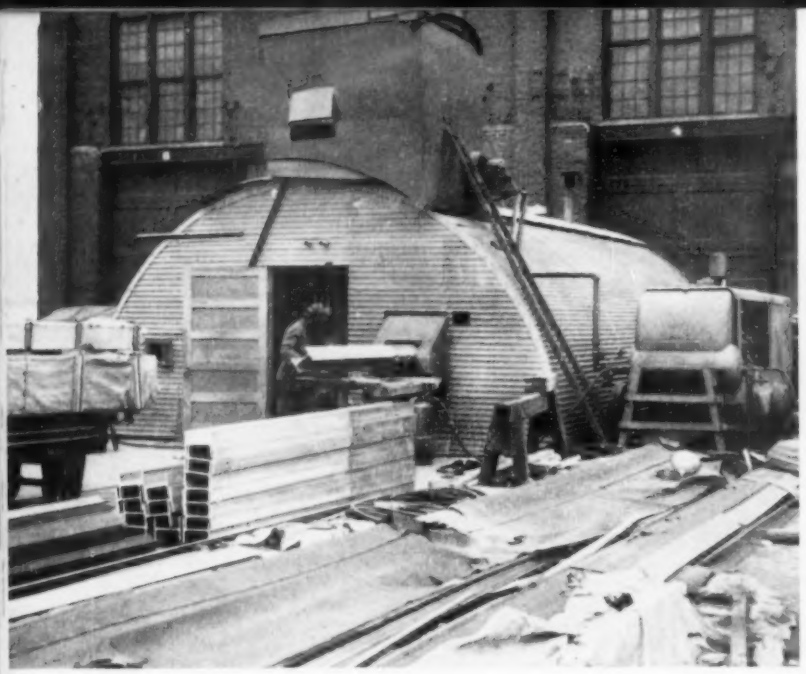


Fig. 1—First step was blast cleaning of the aluminum structural members. Here a workman, protected by a heavy helmet from the steel particles, shoves a member into the blast-cleaning cabinet

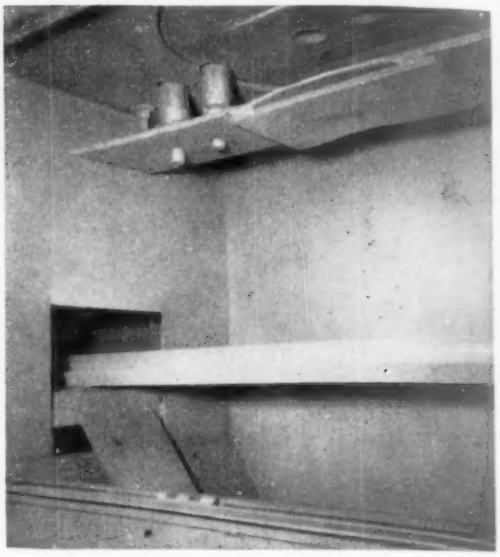


Fig. 2—Interior of the blast-cleaning cabinet, showing entrance of an aluminum-alloy channel. Note the protecting baffle at top for the two upper blasting nozzles

Metallizing Helps to Build

CREATION of new streamlined luxury trains, shortly to travel the nation's rails, will owe much to the work of ten ex-G.I.'s. Recruited by the John Nooter Boiler Works Co., these men have completed the biggest aluminum metallizing job ever attempted, and in doing so they have hacked out new trails in both metallizing and the improvement of railway equipment.

Some of the Missouri Pacific's new $10,000,000 Sunshine Eagle streamliners are being fabricated at the St. Charles, Mo., plant of the American Car and Foundry Co. The use of aluminum alloy in these railway coaches makes possible a greater pay load since the car bodies, less undercarriage and interior appointments, are estimated to be 30 to 35% lighter than those constructed of materials previously used.

CORROSION PROTECTION

To render corrosion-resistant the underframework of these streamlined coaches, the Nooter organization set up a field assembly line at St. Charles. The job called for the coating of a total surface area of some 63,000 sq ft of extruded aluminum-alloy shapes with a 0.012-in. thickness of pure aluminum. This procedure, commonly known as "alcladding," was first employed on the alumimum-alloy sheets used for the fabrication of aircraft. Such sheets, however, may be clad with pure aluminum during rolling, a process not possible to the odd-shaped extrusions. These can only be alclad by the metallizing process.

Metallizing on this giant scale necessitated a continuous production line for processing the material through a semiautomatic blast-cleaning and metallizing set-up. This line was designed and built by the Nooter metallizing division in a Quonset hut (Fig. 1).

First step in the process was to blast clean each structural member to provide a bond for the sprayed aluminum. The beams entered the hut through a continuously operated blast-cleaning cabinet. Continuous operation was made possible by an

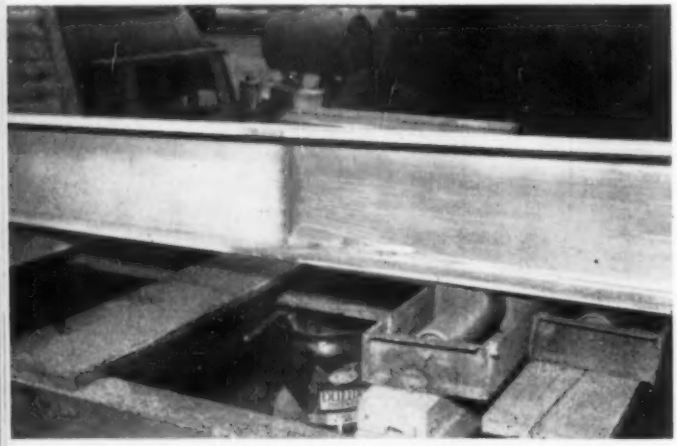


Fig. 5 — The beams are "alclad" with a layer of corrosion-resistant aluminum 0.012 in. thick. Here the section at left has been sprayed with "skin"; that on the right side is unfinished. Metallizing is the only way this job could have been accomplished

Fig. 3—Passing through the blasting cabinet, the aluminum-alloy member is placed on a roller conveyor and carried across the hut to the metallizing booth (Fig. 4)

Fig. 4—This workman sprays the blast-cleaned and pitted member with pure aluminum. Aluminum wire, seen just above the man's right elbow, is atomized in the gun by compressed air and flame

Streamlined Railway Coaches

BY WALTER B. MEYER, *Chief, Metallizing Division, John Nooter Boiler Works Co., St. Louis.*

abrasive elevator, which filled the idle generator while the alternate was blasting. In passing through the cabinet (Fig. 2), the structurals were exposed to opposed pressure-blast nozzles through which G-25 angular steel grit was projected at a pressure of 90 psi.

Metallizing Booth

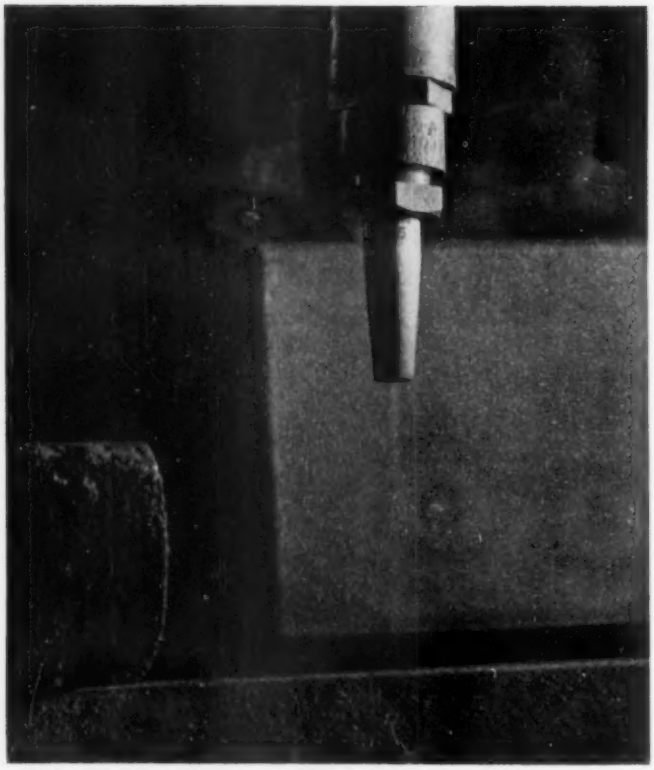
Passing out of the blast cabinet, the structural members progressed down a conveyor line (Fig. 3) and were transferred to the opposite side of the hut into a spray booth fitted with gravity conveyors. Here an air exhaust carried away the metal fumes, and the workers were further protected by respirators.

The largest metallizing guns available were used by the three operators to atomize 3/16-in. aluminum wire and deposit it on the surfaces of the aluminum-alloy structurals. As shown in Fig. 4, these large-size metallizing guns were each suspended from a trolley by means of a flexible spring. The spring allowed vertical movement, while the rollers on the trolley allowed lateral motion. How the section looked, both sprayed and unsprayed, is shown by Fig. 5.

After metallizing, the pieces were immediately spray painted with zinc-chromate primer, and the thickness of the skin was checked with a micrometer (Fig. 6). The finished beam was then ready to be punched and riveted into the structural framework.

Among the Nooter crew of ex-servicemen, a former master sergeant, who saw service in Alaska, acted as foreman of this assembly-line metallizing project. The balance of the gang were men from both the Army and the Navy who have seen service in China, Italy, England, Germany and France as well as in both the Atlantic and the Pacific oceans.

Fig. 6 — Walter Meyer, Nooter metallizing chief (right of photo), and Foreman Joseph Peressin check the thickness of the aluminum skin with a micrometer. On the left a workman finishes the job by applying a zinc-chromate primer with a spray-paint gun



Flux-Injection Cutting-I

Full details are given here of a process which makes it possible to flame-cut stainless steels on a production basis by injecting powdered flux via the cutting-oxygen stream.

BY G. E. BELLEW

Steel Mill Specialist,
Air Reduction Co.

Fig. 3—The pulverized flux, emerging from the cutting orifice, is carried by the oxygen stream to the kerf

SINCE the first progress report appeared a year ago, the flux-injection method of oxidation cutting has become a firmly established production technique for stainless steels in representative steel-working shops all over the country. Like most new methods, however, the flux-injection process had to meet and overcome its fair share of difficulties.

WHY EARLIER FAILURES

The alloys which we group as stainless steels vary so widely in their analyses and working characteristics that a considerable amount of test and experience was necessary to determine the proper adjustments of the various cutting factors to assure success with each basic type. It was equally necessary to make careful determinations of the best ways to handle heavy thicknesses. Neither of these data could be secured by strictly laboratory studies. A considerable amount of field testing had to be carried out under actual operating conditions before the process was considered ready for full-scale use on anything resembling a routine basis. Practically all difficulties, however, have now been ironed out.

Let's look back upon the previous attempts to flame-cut stainless steels as mild steels were being cut. The reason why such attempts failed lies in the rapid oxidation of the alloying elements, chiefly chromium, under the cutting-oxygen stream at high temperature. This results in a layer of refractory oxides which do not run off as liquid slag, as in mild-steel cutting, but solidify and block the cut. These undesirable oxides have extremely high melting points.

There are two approaches to the problem, the thermal and the chemical. The flux-injection method represents the second approach. Use of a chemical means to flux the oxides makes possible a true oxidation cut and avoids the difficulties—economic and qualitative— of many methods involving added heat. This process is capable of delivering cutting speeds and edge quality comparable to mild steel flame-cutting, at comparable operating costs.

Special equipment is reduced to the minimum. Standard cutting machines may be used, equipped with a conventional three-base torch. The only special auxiliary equipment required is the flux feeder.

This device (Fig. 1) is the operating heart of the flux-injection method. It consists of a pressurized vibratory chamber, of sufficient capacity for a normal eight hours of cutting, with suitable controls to regulate operation. The unit is fully portable and requires little floor space. In a set-up of flux-injection apparatus, the only variation from a mild steel set-up is the coupling of the flux feeder into the cutting-oxygen line (schematic diagram, Fig. 2). This is done by means of connections for standard hose fittings on the rear of the feeder unit.

CONTROLLED FLUX FEEDING

The secret of the operation of flux-injection is the efficient mechanical introduction of the chemical fluxing agent directly into the cut. This is achieved by feeding a controlled amount of the finely pulverized, non-metallic flux, dispensed by the flux-feeder unit, into the cutting-oxygen stream. Thus the flux and the cutting oxygen enter the cut (Fig. 3) at the same time and at the same velocity, and the optimum combined effect of almost simultaneously oxidizing the steel and fluxing the oxides can be obtained.

Injection of the flux into the cut makes no change in the operating flexibility of standard oxy-acetylene cutting. It is readily possible to do almost anything with the process that

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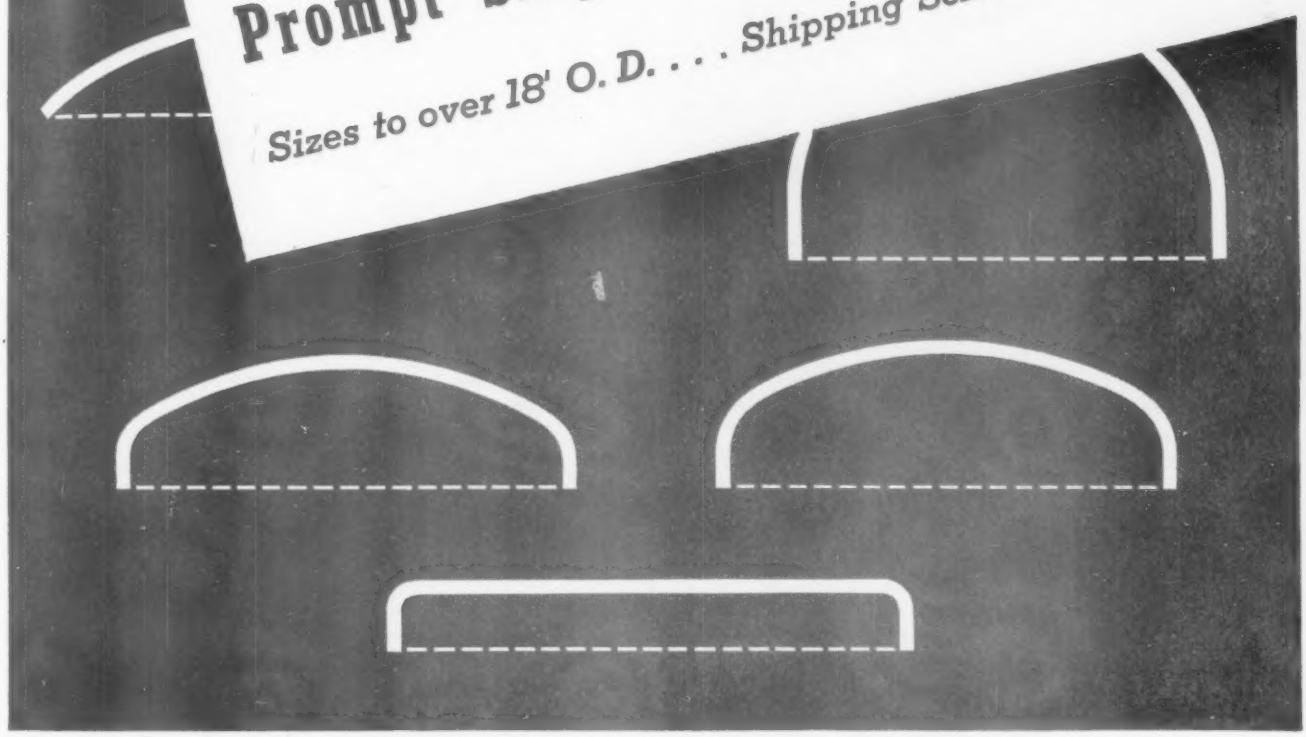

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FOUR INCHES TO OVER EIGHTEEN FEET IN DIAMETER

Fig. 1—The self-contained flux feeder is the essential extra equipment for flux-injection cutting. This unit is portable and has centralized controls

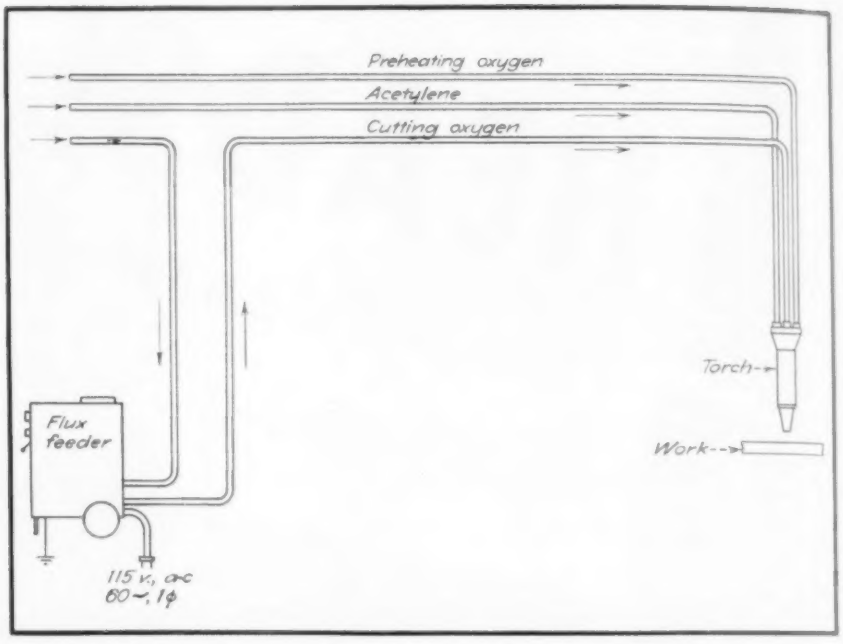


Fig. 2—Schematic connections for cutting stainless with the flux feeder

can be done in mild-steel cutting. The samples shown in Fig. 4 include several types of sharp points and corners, compound curves and slots. In the same illustration, the junction between a vertical and a bevel cut shows the excellent degree of cut control possible.

Comparison with Machining

The edge quality compares favorably with that of cuts in standard mild steel, although somewhat different and more precise adjustments of cutting variables are usually required for best results. Somewhat higher preheat is necessary, and cutting-oxygen pressures will vary from those used for mild steel of equal thickness, though not to sufficient extent to affect the operating costs appreciably.

Cutting speeds on the most widely used thicknesses of stainless also compare favorably with mild steel-operations, although they will sometimes prove somewhat slower. In considering speeds, however, the really valid comparison for the stainless-steel fabricator is not between flux-injection cutting and ordinary flame-cutting. To obtain equivalent quality on stainless, machining methods have hitherto been the only real alternative. Such methods deliver excellent quality but are so slow and expensive that the savings effected by flux-injection cutting sometimes appear almost unbelievable.

The cutting capacity of the flux-injection method appears to be ample for any usual ingot, riser or slab. The heaviest sections available for test—ingots in the 25-30 in. range—have been cut readily. Unless stack cutting is applicable, light gauges (below ⅛ in.) are more economically and more efficiently handled by shearing, punching or other mechanical means. This is true, however, of any sheet metal.

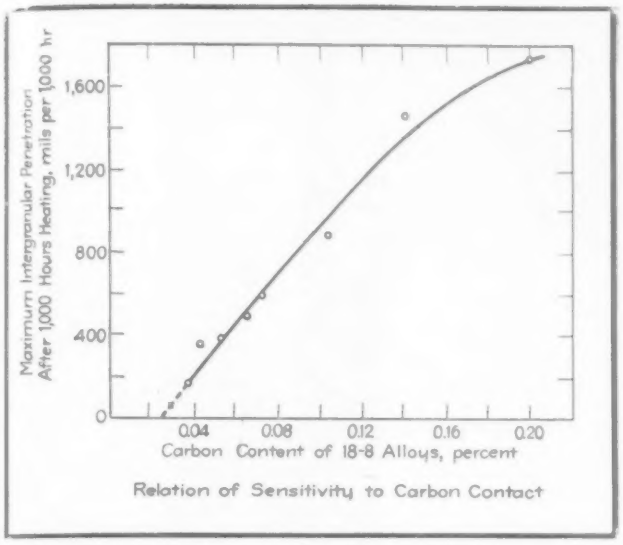
Stack cutting is perfectly feasible and even simpler on stainless than on mild steel using conventional techniques. With flux-injection equipment, the insulating effects of the small air gaps between sheets seem to have little or no bearing on results, so the clamping problem is virtually eleminated. This effects a worth-while saving in handling and set-up time.

Many other standard flame-cutting techniques, with their proved economy, flexibility and speed, can be adapted to stainless steel by the flux-injection method. Shapes can be nested and interfitted to reduce scrap

Table I. Approximate Guide for Flame-Cutting Chromium-Nickel Stainless Steels

Thickness (inches)	¼	⅜	½	¾	1	1¼	1½	2	2½	3	4	5	6	7	8	10
Tip Size*	2	2	2	3	4	4	5	5	6	7	7	8	8	8	9	10
Cutting Oxygen (psi)...	55	65	75	65	55	65	55	60	65	75	85	85	90	95	105	120
Speed† (in. per min)...	11	9	9	8	9	9	9	8	7	6	5	4	5	3½	3	3

*Airco style 138 or style 164 cutting tips.
†Speeds given are for chrome-nickel steels with hot mill finish. For clean chrome-nickel plate and for straight-chromium types, speeds increase 25-75%.



Data courtesy Metal Progress and American Society for Metals

Fig. 5—Graph showing relation of corrosion sensitivity after heating to carbon content of 18-8 stainless

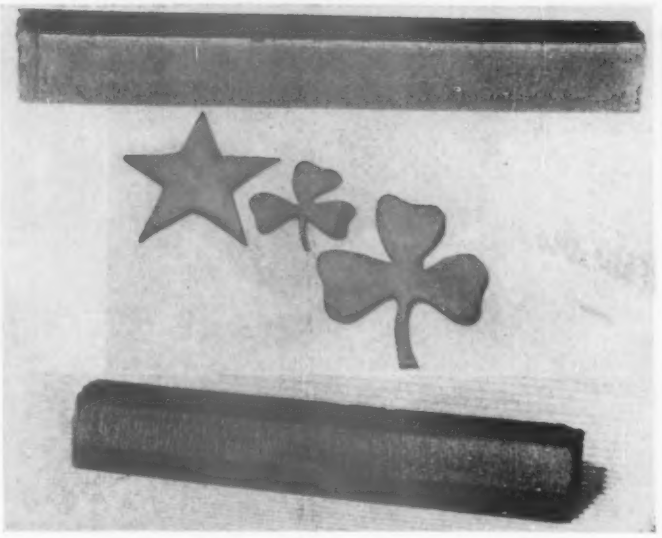


Fig. 4—Intricate curves, sharp points and bevel cuts are well within the scope of flux-injection cutting. Quality compares favorably with flame-cuts on mild steel

to negligible levels. Rough shaping operations prior to finish machining can be carried to such tolerances that only a light finishing cut will be required. Edge preparation for welding, riser cutting, slab ripping, ingot cropping and other flame-cutting operations are all within the scope of the flux-injection process.

Carbide Precipitation

Unfortunately, the most widely used stainless steels—the austenitic chromium-nickel class which includes the popular 18-8 range—raise a serious problem when they are handled in any process involving such high-temperature levels as are found in flame-cutting. The extent to which the steel corrosion resistance may be affected by carbide precipitation is a recognized difficulty in welding, heat treating and forging and must be faced in any kind of flame-cutting as well.

Carbide precipitation occurs when the austenitic chrome-nickel alloys are held for any appreciable time in the critical temperature range between 800 and 1,600 F and particularly around 1,400 F. In this temperature range, carbon and chromium have great affinity, and they tend to combine chemically and precipitate in the grain boundaries as chromium carbides. This robs the alloy grains of their chromium content and lowers the corrosion resistance of the heat-affected area to some (not all) corrosive agents.

Since the problem must be faced whenever stainless is heated into or above the critical range, it has long been familiar to those who weld chrome-nickel stainless. The same factors that govern carbide precipitation in welding also apply in flame-cutting.

One of these factors is the time-temperature relationship. An appreciably long period at 950 F has little effect on corrosion resistance, while a very short time at the more critical level of 1,400 F will cause far more susceptibility to attack. From this, we may deduce that the fastest possible transition time through the critical range will help minimize and may even serve to eliminate the difficulty for all practical purposes.

Low Carbon, Less Precipitation

Another factor of importance is the relationship between carbon content and chromium content. The higher the ratio of chromium to carbon, the less the danger of serious loss of corrosion resistance. For instance, a high-carbon steel of 11-12% chromium would suffer far more seriously from a brief time at the critical temperature than a low-carbon material of 20-25% chromium.

Actually, the carbon content itself, without regard to other elements present, is a key factor in the problem of carbide precipitation. As Fig. 5 indicates, the curve representing the degree of susceptibility to corrosion (after a given period at the critical temperature) rises in almost direct proportion to the carbon content of the alloy up to about 0.20% C, at which level it flattens out. Since most all stainless alloys of the chrome-nickel class are under 0.20% C, we may take it as a general rule that as carbon content increases, the effect of a given time at critical temperature in damaging the corrosion resistance will increase proportionately.

The size and depth of the heat-affected zone is governed largely by the low heat conductivity of the

(Continued on page 74)

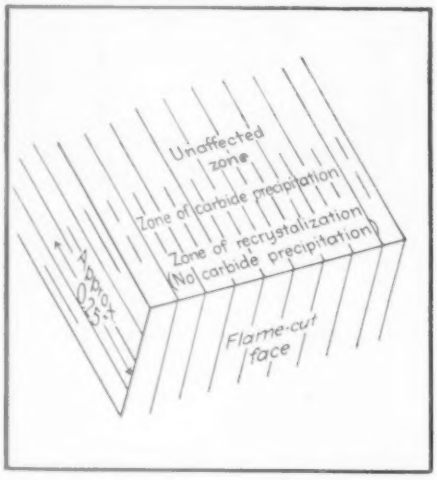


Fig. 6—Schematic diagram of heat-affected zone. Bands are narrow because alloy is of low heat conductivity

Short Cuts and Kinks

Courtesy The Gasflux Co.

Flame-cleaning enamel insulation from the ends of wire coils at Westinghouse Electric Corp. The flux is carried in the fuel gas

Gas-Fluxed Coil Wires

THE lighting division of the Westinghouse Electric Corp. was confronted with an interesting problem in the manufacture of small coils of enameled wire. After a coil has been wound, it is necessary to tin the terminal with soft solder, and this calls for the removal of the enamel insulation for one inch from each end.

Removal by mechanical means was too slow. Burning off the enamel with a small oxy-gas brazing torch was faster but left a deposit of oxide and soot, which had to be removed with emery paper before a good tinning job could be done.

Tests were then made with gas fluxing. A unit of this type was connected into the fuel gas line supplying the torch. The "flux in the flame" was so satisfactory that five additional units were installed to take care of the 36 work stations.

Each of these fluxing units consists of a container filled with a fluxing compound carried in solution in a highly volatile, inflammable liquid. A cotton wick is kept saturated with the flux solution. The fuel gas picks up the flux vapor as it passes through the container and delivers it to the torch. A regulating and by-pass valve permits operation with any amount of flux desired.

Each of the six gas-fluxing units is installed beneath a table which accommodates six soldering stations, three on each side. A station is furnished with a jar of paste soldering flux, a small melting pot filled with soft solder and a small, straight-tip oxy-gas torch. The torch is mounted vertically and equipped with a pilot light and foot-pedal control.

Operation is simple. The operator starts the torch by pressure on the pedal and passes the excess wire of a coil through the flame until it gets white hot at the point of cut-off. The effect of the flux-bearing flame is to strip off the enamel and leave the end clean. A slight pull separates the scrap end. The wires are secured in the coil with adhesive tape, stripped ends exposed, and each end is dipped into the paste flux and then into the molten solder. It is then tinned and ready for final assembly.

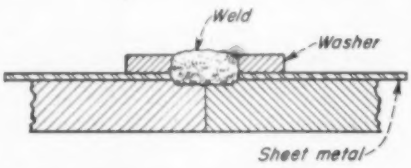
The gas-fluxing method is customarily used in brazing operations to do away with the dipping of the filler rod into flux or the brushing of flux onto the workpieces. In the wire-stripping operation, it is the function of the flux to dissolve and remove oxides and keep the hot metal clean.

☆ ☆

Welding Sheet Metal

By Martin Friedman, Jr.

NOT infrequently a job shop operator is confronted with the problem of welding light steel panels to a heavy beam or other heavy member. It is often advantageous for him to be able to weld the sheet metal without cutting down the current or changing electrodes. Many weldors will say that the task of welding 26-gauge sheet with a ¼-in. electrode is impossible. However, I find that it can be done without burning through the sheet.



How to weld sheet metal to a heavy plate with a large electrode. Simply plug weld through the hole in a ½-in. washer

The accompanying sketch shows how—by placing a ½-in. washer on the sheet metal and plug welding through the washer hole. This not only gives a good weld with a large electrode but also reinforces the sheet at the point of connection so that it will not tear out readily.

Courtesy Templeton, Kenly & Co.

Straightening bent uprights is only one of the uses for this 10-ton jack, which can also be used to hold members for welding

Straightening Bent Upright

AN UPRIGHT member of a quarry conveyor had become seriously bent outward from recurring stresses caused by high winds. This conveyor is used at the quarry of L. S. Hackney & Sons, Davis Junction, Ill., to carry rock from the pulverizer to the stock pile. In order not to interrupt production for more than a minimum time, it was decided to straighten the bent member on the job.

The picture shows how it was done. The two uprights were held in line by a chain wrapped around them several feet above the affected part while a 10-ton push-pull jack was applied to pull the bent member into place. The member (right in illustration) was heated thoroughly in order to facilitate the straightening operation. The conveyor was soon back in service.

The same jack that was used for this job can also be used to hold large members together for welding or for any application that requires pushing, pulling, clamping or lifting.

☆ ☆

Heat Treating Aluminum

By J. Edwin Burkhardt

PRODUCTION delays caused by the heat treating of various aluminum alloys at different time periods have been practically eliminated at the Glenn L. Martin Co., Baltimore, through a time cycle for heat treatment that I suggested. This cycle was found satisfactory for at least four different alloys—53S, Alclad 14S, R-301 and 61S. Under the old method these alloys were aged at different time periods; now all four are aged together at 350 F for eight hours or 340 F for ten hours. This saves at least 40 hours of furnace time each week.

Chart for Pipe Problems

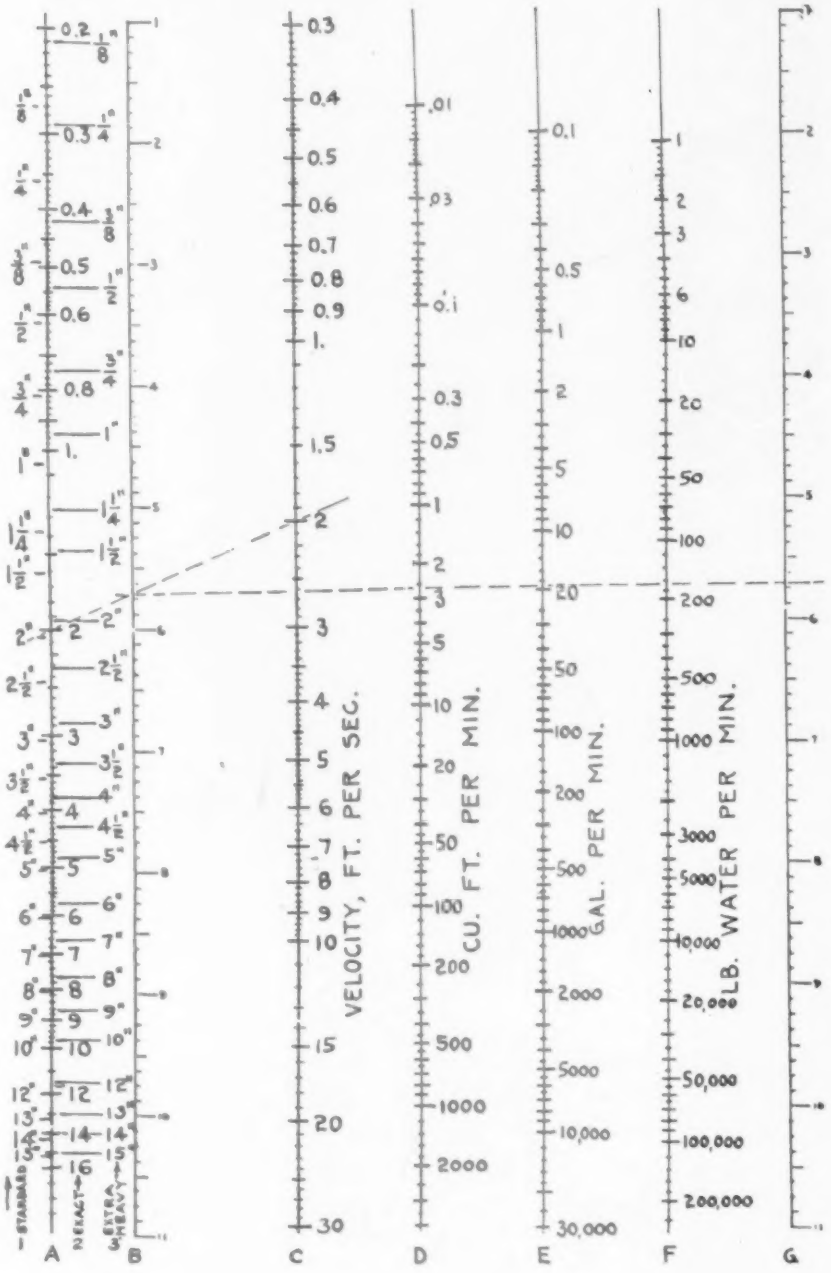
By W. F. SCHAPHORST, M.E.

HAVE you ever wanted to know the cubic feet per minute of liquid or gas flowing through pipe? Or the gallons per minute, pounds of water per minute, velocity of flow or exact internal diameter of the pipe regardless of its standard size? The accompanying nomogram takes care of most of these problems in a very simple way.

First, it will be noted that there are three sets of figures given in connection with the extreme left-hand column A. The first column of figures at the left, marked "1 Standard," gives the internal diameter of standard pipe (somewhat greater than 1 for a 1-in. standard pipe); the column of figures marked "2 Exact" gives the exact diameter. The column of figures marked "3 Extra Heavy" gives the internal diameter of extra-heavy pipe.

How much water is passing through a pipe having an ID of exactly 2 in., the velocity of the water being 2 fps? To apply the chart to this problem, locate 2 in column A over the word "Exact" and run a straight line from this point through the 2 in column C (as shown by slanted dotted line). At intersection of this line with column B, run a straight line horizontally to column G, also shown by dotted line. The intersection of this perfectly horizontal line from column B to column G gives answers simultaneously in three columns D, E and F. According to column D, 2.6 cfm of water are flowing through the pipe. Column E shows the volume of flow to be 19.5 gpm. Column F gives the weight of that water as about 165 pounds per minute. For liquids other than water, multiply the value found on column F by the density or specific gravity of the particular liquid or gas.

Inversely, if quantity in either columns D, E or F is known, velocity may be computed with equal ease. First run the horizontal line through the known point in D, E or F to column B. From the intersection on column B, run a second line to the known pipe diameter, column A. The intersection of this second line with column C gives the velocity of the liquid in feet per second.



This chart can be conveniently employed as a conversion chart. For example, how many gallons in 2.6 cu ft? The dotted horizontal line already drawn shows that the answer is about 19.5 gallons, which is also equivalent to about 165 pounds of water. If the liquid were oil having a specific gravity of 0.9, we would multiply the 165 by that figure and obtain an answer of 148.5 lb.

The chart also gives a visual demonstration of the relationship between pipe sizes—standard, exact and extra heavy.

LIKE so many other manufacturers, the Harvey Dental Specialty Co., of Los Angeles has found the answer to their production problem in the low-temperature silver brazing alloy EASY-FLO.

At the right you see the new Harvey Vapor Pressure Sterilizer for modern dental practice, with separate views of the tank and tray. Every arrow points to an EASY-FLO joint—11 in all totaling 7½ lineal feet of brazing on copper, brass and steel—all done in a gas furnace in a little over 6 minutes. That's fast production and it's economical production. Every tank is tested at 100 pounds per square inch—far above the normal operating pressure of 20 pounds at 250°F.

The results of the change from the original soft soldering have been so satisfactory from every angle that Harvey engineers are redesigning other units around silver alloy brazing.

IF YOU CAN USE FASTER, LOWER-COST PRODUCTION of strong, leak-tight, virtually indestructible joints in ferrous, non-ferrous or dissimilar metals, then you want the facts about low-temperature silver alloy brazing. One of our field engineers will give them to you—without obligation. Call or write our nearest office. For printed details, write today for BULLETIN 12-A.

HANDY & HARMAN

82 FULTON STREET **NEW YORK 7, N. Y.**

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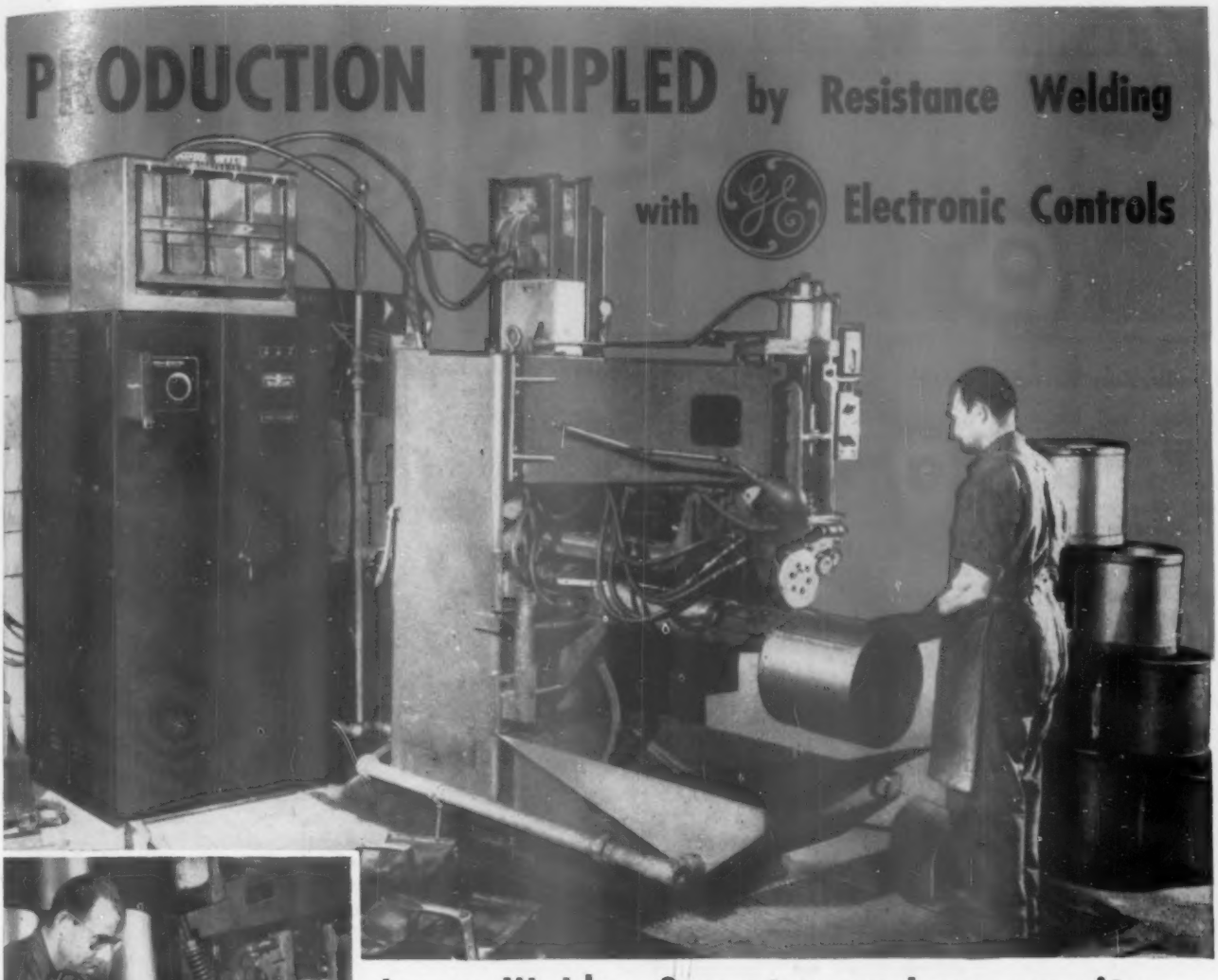
PRODUCTION TRIPLED by Resistance Welding with G-E Electronic Controls



By shifting from acetylene welding to resistance welding with G-E controls, Tarrant Manufacturing Co., Saratoga Springs, N. Y., has tripled their production of road maintenance equipment.

Actual increase in production rate is even greater. It took three minutes to acetylene weld the bottom seam of the roofer's bucket pictured above; now, it takes 20 seconds. G-E controls assure automatic and accurate timing of the welding cycle; thus, faster, more consistent welding.

Large Welder Operates on Low-capacity Power Lines . . . Thanks to Series Capacitors

No Large Voltage Drop . . . Unity Power Factor

This large welder operates on low-capacity power lines, with no large voltage drop, thanks to G-E series capacitors. They reduce the normal welder demand from 100 kva to 40 kva, and correct the power factor to unity. There is no light flicker in the plant or surrounding residential area. For details on series capacitors, ask for Bulletin, GET-1134.

New Lines of Synchronous and Nonsynchronous Controls

1. Control is factory-assembled in one, easy-to-install cabinet.
2. Easy servicing through large side door of cabinet.
3. Control station always faces operator.

For further details, ask for Bulletins GEA-4699 and GEA-4726.

HAVE YOU SEEN

"This Is Resistance Welding", G.E.'s 30-minute, full-color movie? Your nearest G-E office, local utility, or resistance welder manufacturer representative will be glad to arrange a free showing.

GENERAL ELECTRIC

Apparatus Department, Sec. B645-43
General Electric Company
Schenectady 5, New York

Please send me the following bulletins:

- ☐ GEA-4699, Synchronous Precision Control for Spot and Projection Welding
- ☐ GEA-4726, Nonsynchronous Control for Spot and Projection Welding
- ☐ GEA-4571, The Importance of Control
- ☐ GET-1134, Application of Series Capacitors to Resistance Welding Machines

Name.....

Company.....

Address.....

On the Job

Production Silver Brazing

THREE steel parts—spider, drive shaft and bearing retainer—are silver brazed in one operation by the Reading Hardware Corp., Reading, Pa., to form the rotor of a motorized lawn mower. Four assemblies are brazed together in a production time of 30 seconds, an average of 7½ seconds each, and the alignment between the parts is held to close tolerances.

Parts come to the brazing station cleaned and ready for assembly. A girl assembler places four spiders in a ceramic fixture and brushes the center hole of each with silver-brazing flux. A ring of 3/64-in. brazing wire, ⅝-in. ID, is then slipped on the drive shaft. Both the end of the shaft and the brazing-alloy ring are liberally brushed with flux. A bearing retainer is placed over the shaft end, and the two parts are inserted in place on the spider. When four such assemblies have been completed, the fixture is ready for heating.

An induction-heating unit with two brazing stations is used. This is equipped with jigs that align the parts and maintain close tolerances between them, especially between the drive shaft and the bearing retainer. The fixture holding the four assemblies is placed over the heating coils so that the heating may be done from the bottom. The coils do not interfere with the operations of the jigs, which are lowered over the parts while they are heating. Heat can be concentrated on the heavier drive shaft and spider in order to prevent warpage of the lighter bearing retainer.

With two brazing stations, one heating while the other is being loaded, it is possible to attain a production of 3,840 units in an 8-hour day. Final inspection requires the inspector to see that there is a full ring of alloy around the end of the drive shaft. Each brazed part is also given a shock test.

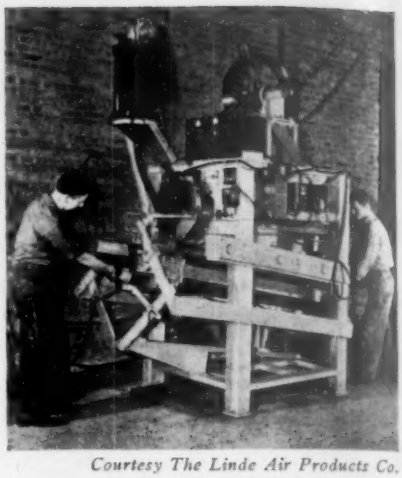
☆ ☆

Mill for Continuous Welding

PEAK production of light-gauge water tanks had been reached with hand-welding methods at the Bell and Gossett Co., Morton Grove, Ill. Faced with increased production schedules, the company's engineering department decided to construct a mill that would permit continuous submerged-melt welding.

The resulting mill (see picture) was designed with three full-length guides, which can be adjusted by a centrally located worm to handle tanks of different diameters. Four equispaced roller guides confine expansion in the welding zone. The mill is now used to weld the longitudinal seams of 9-in. diam., 14-gauge water softener tanks.

The tank shells are die-formed in three steps and fed into the rear of the mill by a helper, who starts the shell over the mandrel. The unwelded seam is split by the knife-bladed mandrel support, which acts as a guide to align the seam properly. Serrated rollers pass the shell over the mandrel and under the automatic welding head. Roller bearings close the shell as it passes under the submerged-melt head.



Courtesy The Linde Air Products Co.

This continuous welding mill, designed and built by Bell and Gossett, engineers, may be adapted to varying tank diameters

A spring-loaded, water-cooled copper backing shoe, incorporated in the mandrel directly under the welding zone, keeps the molten weld puddle from falling through and yet permits 100% penetration of the weld.

Welding is achieved at a speed of 120 in. per minute, using 500 amp. d-c. Production with this mill has been increased to 180 seam-welded tanks per hour.

☆ ☆

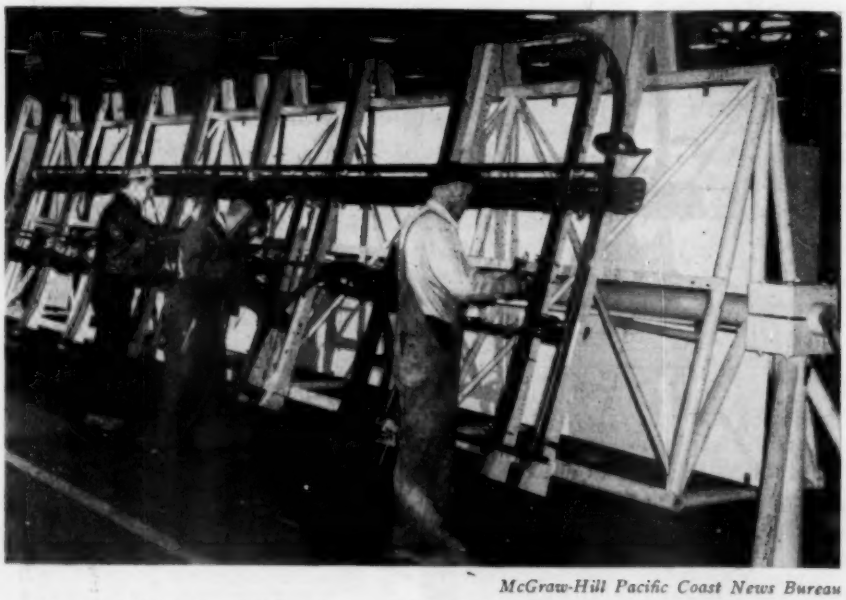
Building Better Buses

A METHOD of bus construction based on the use of rotatable jigs has resulted in a substantial reduction of man-hours on assembly at the Seattle, Wash., plant of the Kenworth Motor Truck Corp. This method, believed to be new in the bus industry, calls for the production of seven major subassemblies — two sides, two ends, roof, floor and chassis frame—each of which is brought as near completion as possible before final assembly begins.

Major subassemblies are fabricated on six rotatable jigs, each of which is bent into shape on a plaster mock-up. Should design changes require a jig to be changed, or the jig need realignment after continued use, it is simply taken back to the mock-up for the necessary alterations. All of the jigs have holes for castors in their base supports and can be wheeled to any desired position.

The rotatable jig makes it possible for workmen to position their work at the most convenient level and hold it there in perfect balance. The value of this feature to the weldor is demonstrated in the accompanying picture of a bus side assembly. Because the jig is on two points of support and is not fastened down, it is not affected by floor imperfections or by vibrations.

"With our jigs, we could build a bus on the side of a hill," asserts H. E. Simi, head of the company's bus division.



McGraw-Hill Pacific Coast News Bureau

This assembly is the complete side of a bus, under construction at the Kenworth Motor Truck Corp., Seattle. Work is held by the pivoted jig, one of six used for subassembly here

Grain Press Restored

By H. H. Hose

A CONTINUOUS grain press manufactured by the Davenport Machine and Foundry Co., Davenport, Ia., is used extensively in breweries, distilleries, malting concerns and citrus industries. Like other types of equipment with rotating parts, this press experiences considerable wear on critical operating parts such as the circular disc shown in the accompanying picture.

A close tolerance between this disc and the housing is imperative to avoid grain or pulp loss. Occasionally, therefore, it becomes necessary to add new metal in order to restore the outer circumference of the rotating disc to its original size. As the segments forming the disc are made out of either bronze or cast iron,

Courtesy Ampco Metal, Inc.

Rebuilt disc for a grain press after final machining. A portion of the bronze overlay may be seen on the front segment

it logically follows that a copper-base electrode should be employed. A phosphor-bronze electrode in diameters of 5/32 and 3/16 in. was selected, and the weld metal was deposited by the metal-arc process, using reverse polarity, d-c.

The rebuilt disc thus repaired has already served as long a life as the original equipment.

☆ ☆

Minimizing Distortion

DISTORTION is frequently met when worn surfaces are to be built up with an amount of weld metal that is large in proportion to the parent metal. This type of distortion can be minimized, say welding engineers of the General Electric Co., if certain rules are faithfully followed.

First, the surface to be built up should be ground smooth, unless it has already been worn so. Preheating to unlock existing stresses is helpful. Small-diameter electrodes should be used, and the current kept in the midrange for the particular electrode size employed in order to prevent excessive local heating.

Beads should be kept thin and should be well peened. Only small areas should be covered between peenings. Alternate layers should be laid at right angles, and adjacent beads should overlap about 40% of the bead width. Plenty of pressure on the wire brush between welds will help yield sound metal build-up.

Titan

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Here is good news for welders who look for only the best in welding equipment and supplies. TITAN Bronze Welding Rods, recognized the world over for their high quality and uniformity, are now available in whatever quantity you require . . . and can be shipped promptly.

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With production and labor costs mounting, it will pay you more than ever before to use Burdox Extra-Flex Cable for your welding. "4 FEATURE" Extra-Flex Cable gives you more welds... better welds per man-hour because it works with the man-on-the-job. With its many exclusive production advantages, it costs you far less than you expect to pay for cable of this high quality. Next time you order cable specify "Extra-Flex"!

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FLUX-INJECTION CUTTING

(*Continued from page 63*)

alloys. This factor piles the heat up in a narrow band very near the kerf —a band only a fraction of an inch in width and starting only a fraction from the cut face. Beyond this band the metal is unaffected, as shown in Fig. 6.

Preventives and Remedies

These factors being all variable and/or controllable, singly or in their relationship to each other, it is possible to cope with the carbide precipitation problem in several ways. Preventatively, the best solution—just as in welding—is the use of stabilized material. When freedom in choosing the analysis permits, selection of a very low-carbon alloy can have much the same effect. Similarly, a reasonably low-carbon, high-chromium alloy may prove adequate when the end use of the material is one of those in which minor carbide precipitation will not lead to serious corrosion.

When the preventive measures are not available, there are several satisfactory remedial measures which can be taken during or after flame-cutting. The first of these is to make adequate provision for bringing the metal swiftly through the critical temperature range, which will minimize or eliminate the undesirable effects.

Another remedial measure is to heat treat the material after cutting. When this is done properly, either in the normal course of fabrication or as an added step, the carbide zone can be entirely eliminated and the metal restored to its original state.

A third measure, where a finish machining operation is required in any case, is to allow a small amount of surplus metal in making the flame-cut so that the affected area can be machined away.

If the cut edges are to be welded, the heat effects from flux-injection cutting will be superseded by those of welding, and adequate provision is usually already made in good design practice for stainless weldments.

Taking these aspects of the problem fully into account, there seems little reason to fear that carbide precipitation difficulty will prove unsurmountable in most applications. Generalities about stainless metallurgy

McKAY

STAINLESS STEEL ELECTRODES

FOR WELDING ALL TYPES OF CHROME AND CHROME-NICKEL STEELS

Whatever your requirements for welding low-chrome, high-chrome and chrome nickel steels—McKay research, development, and production assure you the proper shielded-arc electrodes for each particular group of these metals.

McKay Stainless Electrodes meet the metallurgical and mechanical requirements for welding over 100 analyses of stainless steels produced by the various steel manufacturers. McKay Electrodes possess superior chemical properties and smooth, uniform performance which give optimum penetration and better fusion of the weld metal with the parent metal.

Before welding the particular stainless steels you are using, call on McKay Engineers for recommendations. They will be glad to advise you on electrode selection and welding procedure for obtaining highly satisfactory results. Inquiries are invited on *standard* or *special* electrodes for welding *stainless, alloy* and *mild* steels.

McKAY STAINLESS-STEEL ELECTRODES

McKay	A.I.S.I.	McKay	A.I.S.I.
18-8	308	12 Cr	410
25-12	309	16 Cr	430
25-12 Cb	309 Cb	18 Cr	442
25-20	310	28 Cr	446
18-8 Mo	316	2 Cr Mo	None
18-8 Mo Cb	316 Cb	5 Cr Mo	502
18-8 Mo	317	9 Cr Mo	None
15-35	330	15-60	None
18-8 Cb	347	19-9 W Mo	None

McKAY MILD-STEEL ELECTRODES

McKay	A.W.S.	McKay	A.W.S.
21	E4510	16-H	None
3	E4520	117	None
14	E6013	19	None
15	E6010	10	E6013
17	E6012	715	E7010
116	E6012	711	E7011
16	E6020	714	None
18	E6030	716	E7020

McKAY SPECIAL-PURPOSE ELECTRODES

Pluralloy 70	Pluralloy 100	Frogalloy M	Tool & Die
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Whether you want to know how to employ welding to best advantage or which electrodes to use, McKay can help you determine the solution. Write today.

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POT VALVE PUT BACK IN SERVICE WITH BRIDGEPORT No.192 LOW FUMING BRONZE

The neck of this pot valve was repaired in a matter of hours by brazing with Bridgeport No. 192 Low Fuming Bronze Rod. It was tested for 1200 pounds hydrostatic pressure, and returned to service at a great saving in time and expense.

Bridgeport Bronze Welding Rod saves you labor and money. Equipment can be repaired without elaborate setups for general heating and stress relieving, since the base metal need only be heated to a cherry red. Repaired sections are often stronger than the original part.

BRIDGEPORT "BRONZE WELDING ALLOYS" will be mailed to you promptly . . . write to main office at 30 Grand Street, Bridgeport 2, Conn.

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BRIDGEPORT No. 192 BRONZE—LOW FUMING
General purpose alloy. Ideal for repairing heavy-duty equipment as well as small parts—building up wearing surfaces—joining parts in industrial and construction work.

BRIDGEPORT BRONZE
Fuses readily at 1625° F. Recommended for uniting cast iron and steel parts—building up wearing surfaces—joining parts in industrial and construction work.

NAVAL BRASS
Not as high in tensile strength as Bridgeport Bronze. Suitable for repairing steel and cast iron—joining piping—building up wearing surfaces.

BRIDGEPORT MANGANESE BRONZE (NAVY)
Recommended for strength and toughness in repairing cast iron and steel castings—building up worn surfaces—joining parts in industrial and construction work.

BRIDGEPORT No. 1232 SILICON BRONZE
Used for oxyacetylene, carbon arc or metallic arc welding methods for making silicon bronze storage tanks, automatic heaters, corrosion-resisting ducts, structural sections, vats, etc.

BRAZING ROD
Satisfactory for conditions that are not subject to great wear or heavy shock loads.

Bronze Welding Rod A PRODUCT OF
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are dangerous to make and do not always apply in specific cases; nevertheless, experience to the present indicates that neither the flame nor the flux has any contaminating effect upon the metal. There does not appear to be any serious risk of otherwise damaging the corrosion resistance by flux-injection cutting once adequate provision has been made for handling the problem of carbide precipitation.

SOME COMMON MISTAKES

Among less experienced operators, some tendencies have appeared to mishandle the flux-injection cutting operation. Typical mistakes are an inclination to use wastefully large amounts of flux, too slow a speed and/or too high an oxygen pressure. The correct adjustment of each of these variables will change appreciably with the alloy being cut and will also change with the tip style in use. An approximate guide to proper adjustment of the variables when using one of the more suitable tip styles is given in Table I.

With the addition of another variable, flux flow, to the adjustments necessary for good cutting, the operator's work becomes a little more complicated. Even the experienced man will find a little trial-and-error work on scrap beneficial before he starts production cutting on an expensive piece of material. With a little practice, however, proficiency comes rapidly, and the average operator soon handles the flux-injection process as easily as he does ordinary mild-steel cutting.

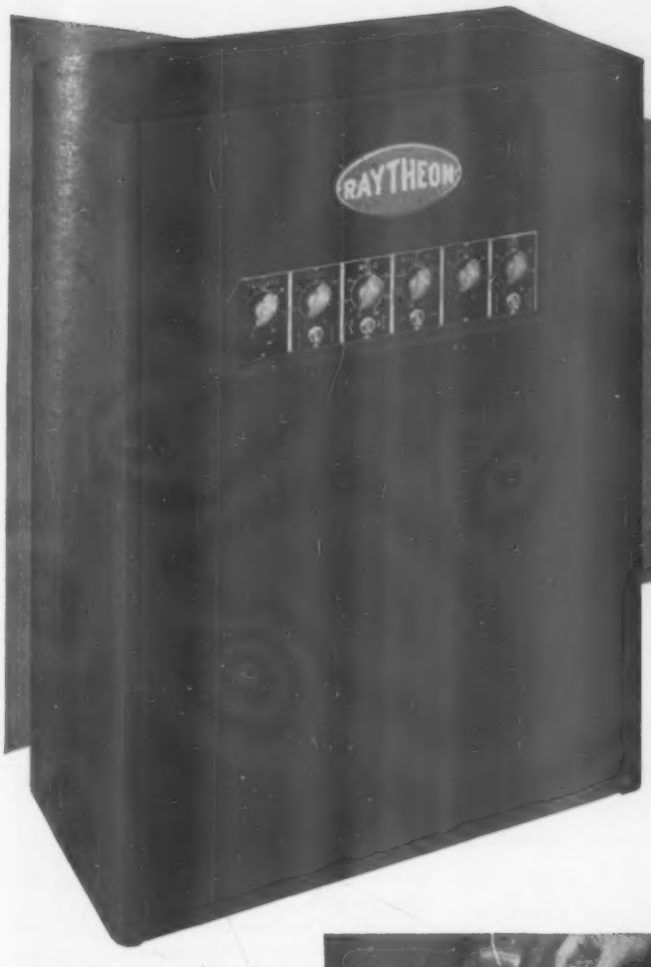
One further precaution should be kept in mind. As in any operation where fumes are evolved, the operator must be protected by adequate ventilation or a fume-removal system.

In Part Two of this article, to be published next month, Mr. Bellew will describe a number of typical production applications for the flux-injection cutting process.

☆ ☆

Electronics Conference in Chicago, Nov. 3-5

A PROGRAM of between 50 and 60 technical papers, covering all phases of electronics, will be presented at the 1947 National Electronics Conference at the Edgewater Beach Hotel, Chicago, being held Nov. 3, 4 and 5. The program is sponsored by the American Institute of Electrical Engineers and Institute of Radio Engineers. Exhibits of the latest electronic equipment are also planned.



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For resistance welding operations which do *not* require electronic synchronous-precision timing of welding power, it still pays to provide *accurate electronic control of all mechanical functions.*

The new line of RAYTHEON Non-Synchronous Controls has been developed to give you just that. Note the many new and exclusive features, then send for detailed information and prices.

Write for illustrated Technical Bulletin

SPECIAL FEATURES ASSURE Accuracy, Convenience, Long life . . .

SEQUENCE-WELD TIMER designed to give full range of timing as specified by NEMA.

IGNITRON TUBE CONTACTOR using standard tube sizes.

CABINET ONLY 28″ high, 21″ wide, 10″ deep contains sequence-weld timer and standard Ignitrons up to size C. (Timer and contactor taking size D Ignitrons slightly larger.)

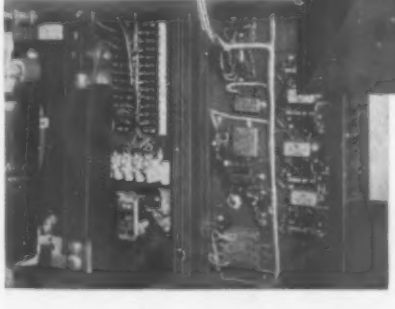
EASILY INTERCHANGEABLE . . . all styles of timers built on common chassis which fits into timing compartment. Permits ready substitution of NEMA 5B timer in place of 3B.

TIMER REMOVABLE without disconnecting, permitting ready inspection of components during operation.

TELEPHONE-TYPE PLUG-IN relays in sequence-weld timer are easily removed, simple to check, quickly replaceable.

QUALITY COMPONENTS, advanced design and simple circuiting assure accuracy and long life.

A–(Right) Top view of 3B Sequence Timer partly removed. Unit readily converted to 24 volt, single or two position, or 110 volt two position operation, by plugging accessory relays into sockets.



B–(Left) Sequence Timer removed for inspection while in operation condition, with all parts exposed for checking.

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News of the Industry

Government Concerned over Steel Output

THE capacity of the steel industry to meet the demands of auto makers and other large steel users over the next few years is rapidly becoming a political as well as a business issue. No immediate governmental action is in sight, but the possibility of government moves to stir up construction of new capacity—both ingot and fabricating—is due to be loudly debated in the coming campaign year. New Deal Democrats, in particular, are trying to commit their party to a steel program.

Spearhead of the New Deal efforts is a bill introduced for propaganda purposes, by Senator Murray late in the session of Congress. It looks toward long-term low-interest RFC loans to steel companies to finance new plants—with a provision waiving interest and amortization payments in any year in which steel production fell below some fixed percentage of capacity. Failing this, the government would build plants and lease them to steel producers.

Meanwhile, the issue has been kept alive in hearings before a sub-committee of the Senate Small Business Committee. These hearings have assumed the character of a running debate on future steel needs. Steel industry spokesmen, basing their figures on experience of prewar years—the boom twenties and the depressed thirties—predict that steel needs in the early fifties, when reconversion demand is past, won't run much over 70 million tons.

A series of government economists, arguing on a different basis, have insisted that if there's no depression, if full employment continues, demand in the fifties will run somewhere between 100 and 120 million ingot tons. At a reasonable rate of operation, this would imply a capacity of something like 110 to 140 tons as compared with the present 91 million tons. And the government men warn that if the demand is not met, that fact in itself might precipitate a depression.

Labor recently took a hand in the debate in the person of Walter Reuther of the United Auto Workers. Testifying in a week in which General Motors sent home most of its work force for lack of steel, Reuther proposed, as an immediate measure, that government and the steel people get together on a system to allocate orders. Idea would be to increase rolling mill output by arranging for long runs of particular products, as was done during the war.

For the long haul, Reuther ranged himself with the expansionists. Estimating demand for autos and trucks during the fifties at about 6 to 7 million units a year. He stated that if the auto industry continues to receive its present (less than prewar) proportion of steel output, this would call for steel production of 105 to 120 million tons.

☆ ☆

Weld Framework of Texas Building

FOURTEEN hundred tons of structural steel were welded in the erection of the 14-story Herman Professional Building, one of the group of buildings comprising the new Texas Medical Center. Eleven arc welding machines were used, and approximately 40,000 lb of E-6010 all-position electrodes were consumed on this big welding job. Consolidated Steel Corp., which has a long history of steel erection throughout Texas and California, was fabricator and erector of the welded framework. The job was under the supervision of C. B. Keith, superintendent, and E. W. Buck, field superintendent. J. F. Bowman was welding engineer.

General contractor for the building was the Linbeck & Dederick Construction Co., Houston, Tex., M. F. Moorman, general superintendent. Kenneth Franzheim and Hedrick & Lindsley, associated architects, of Houston, were responsible for the decision to use welding and for the erection sequence.

☆ ☆

G-E Completes New Magnesium Oxide Plant

WITH completion of its new plant at Pittsfield, Mass., General Electric Corp., has doubled its capacity to produce magnesium oxide. This highly refractory material is used in industrial heating equipment as an insulator between central heating wires and metal sheaths.

Air Force Develops Acetylene Generator

SAFETY under all operating conditions is the chief feature of a new portable acetylene generator designed by the engineering division of the Army Air Force's Air Materiel Command. Developed for use with a standard 55-gallon steel fuel drum, this 48-lb generator, is said to be able to supply all of the acetylene needed for maintenance work at and AAF depot.

The new portable unit has a capacity of about 25 lbs of carbide and produces sufficient acetylene to cut a 2-in. steel plate. Its safety mechanisms were found to operate satisfactorily at pressures of 14 to 15 psi.

This AAF generator is described in detail in a report, "Portable Type Acetylene Generator" (PB-47576), available from the Office of Technical Services, Department of Commerce, Washington 25, D. C. (photostat, $3; microfilm, $1).

☆ ☆

National Tube Installs 25-Mile Heating System

RADIANT heating soon will warm over 7 million cu ft of space in a quarter-mile-long pipe warehouse being built by National Tube Co. at its Lorain, O., plant. The heating system comprises more than 25 miles of 1-in. steel pipe, in 481 individual coils embedded in the concrete floor. The coils are connected in groups, and automatically controlled valves govern the flow of water from four heat exchangers located on a small balcony.

☆ ☆

Carnegie-Illinois Combines Chicago Sales Branches

CHICAGO sales units of Carnegie-Illinois Steel Corp. were recently combined to provide an expanded and more fully coördinated service to midwest steel consumers. The enlarged organization is under the direction of Griswold A. Price, Chicago district sales manager. Newly appointed departmental sales managers are: Edward W. Backes, railroad industries, John H. Morava, manufacturing industries, and George O. With, construction industries.

M. J. Van Dreser, new southern sales manager for Alloy Rods Co., covers his territory by plane from his headquarters in Dallas, Tex.

NEMA Organizes Induction Heater Section

ELEVEN companies manufacturing apparatus for induction and dielectric heating have organized a new electrical product group of the National Electrical Manufacturers Association known as the Induction and Dielectric Heating Apparatus Section. Dr. H. B. Osborn, Jr., sales manager, Tocco division, The Ohio Crankshaft Co., Cleveland, is chairman, and C. W. Miller, sales manager, industrial electronics division, Westinghouse Electric Corp., is vice-chairman.

The eleven member companies of the new NEMA section are: Allis-Chalmers Mfg. Co., Milwaukee; Cutler-Hammer, Inc., Milwaukee; Federal Telephone & Radio Corp., Clifton, N. J.; General Electric Co., Schenectady, N. Y.; The Girdler Corp., Louisville, Ky.; Induction Heating Corp., New York City; Lepel High Frequency Laboratories, Inc., New York City; Ohio Crankshaft Co., Cleveland; RCA Victor Div. of Radio Corp. of America, Camden, N. J.; Weltronic Co., Detroit; Westinghouse Electric Corp., industrial electronics div., Baltimore.

The section will set up equipment standards and ratings, safety requirements and many other factors pointing the way to greater efficiency, increased production, lower costs, faster deliveries and improved service. It is defined as encompassing, induction and/or dielectric heating apparatus, together with accessories.

A general engineering committee has been established under the chairmanship of T. P. Kinn, manager, industrial electronics engineering, Westinghouse. Also formed was a Federal Communications Commission committee, the chief purpose of which is to keep in touch with the FCC. K. E. Kjolseth, manager of sales, induction and dielectric section, industrial heating division, General Electric Co., and J. W. Cable, director of research and development, Induction Heating Corp., have been named chairman and vice-chairman, respectively, of this committee.

Another working arm of the section is its statistical committee, under the chairmanship of Otto Weitmann, vice-president of the Lepel High Frequency Laboratories, Inc.

☆ ☆

Ampco Produces Industrial Film

"GOLDEN HORIZONS," a new 16-mm, 33-minute sound film in technicolor, has been produced by Ampco Metal, Inc., Milwaukee. This new movie tells of the development of copper-base alloys from prehistoric days and shows their present importance in industrial plants. The film is loaned for exhibition without charge, the user paying transportation cost one way.

☆ ☆

American Welding Moves Eastern District Offices

EASTERN district offices of American Welding and Manufacturing Co., Warren, O., have been transferred from 500 Fifth Ave., New York City, to The Industrial Building, 1060 Broad St., Newark 2, N. J.

Victor

WELDING CABLE

FOR YOUR CABLE REQUIREMENTS

Thousands of hair-fine copper strands, to provide utmost flexibility and maximum conductivity, and a tough vulcanized live-rubber jacket make VICTOR Extra-flexible Welding Cable the leader wherever long life, ease of handling and economy are essential. . .

Remember! . . . Your men and machines are no better than the cable you use.

Available immediately in sizes from #6 to 4/0.

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POWER CABLE

Single and multi-conductor Extra-flexible power lead cable available in all sizes.

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FOR BEST WELDING RESULTS USE VICTOR CABLE

Weltronic WATERSAVER

BOOSTS WELDING PROFITS 6 Ways

- Reduces condensation, avoids transformer shafts.
- Decreases mineral deposits, repairs, down time.
- Cuts water use, lowers water bills.
- Reduces sweating, rust, corrosion.
- Lessens disposal overload, saves pumps.
- Prevents community water famine in dry seasons.

BE WATER WISE
ECONOMIZE!

Yes, with the Weltronic Model 226DA1 WaterSaver installed on your resistance welders, you can stop worrying about the High Cost of Water. In 30, 60 or 90 seconds after the operator leaves the welder, the valve closes automatically. You'll see no more transformers blow up when the welder throws the switch in the morning. Your bill for one of the costliest of utilities will now be in direct proportion to production time. Piping will be simplified by the use of smaller returns and pumps will be idle during idle time, instead of working day and night. Lime deposits in transformers and tubes, especially irksome in certain localities, will be a headache just one-third as often and sweating, so destructive to steel and copper parts throughout the system, will be reduced to a minimum. Your community and you will profit in dry seasons because no one will be faced with a sudden disastrous shortage of pure cooling water. Be Water Wise—Economize!

WaterSaver connects to standard welder valve or we will furnish valve. Anyone can install. Attach to welder or any convenient location. Dimensions 13½" high, 7⅜" wide, 6⅛" deep. 115/230/460 volts.

Weltonic Company also manufactures Weld Timer-Contactors, Rectifiers, Induction Heaters, Motor Drives, and other electrical and electronic equipment. Write for descriptive literature, stating your interest.

WELTRONIC COMPANY

This welded container facilitates loading and unloading operations, cuts shipping costs

Welded Shipping Container Cuts Handling Costs 70%

In order to facilitate loading and unloading operations and minimize breakage and pilferage of merchandise shipped by ocean-going and lake vessels, river barges, railroad cars, etc., Dravo Corp., Pittsburgh, has developed a weather tight welded steel container (see picture) having a capacity of 277 cu ft and designed to carry loads up to 12,000 lbs. Use of these containers is expected to reduce cargo handling costs and eliminate the need for considerable amount of packaging materials.

In a trial shipment of 12 containers of this type, between an east coast port and Puerto Rico, material handling costs were reduced approximately 70% as compared to customary methods. Tiering expense was cut about 90%, while dock watching charges, checking and clerking costs were entirely eliminated.

The containers interlock and fit into ships' holds, between decks or on railroad cars with a minimum loss of space. The steel case absorbs the force of any shock or pressure exerted by other cargo. Since lighter packaging can be used for the goods in such containers, the resulting weight savings tend to offset the weight of the containers.

The standard Dravo shipping container is 7 ft, 9 in. long, 6 ft, 5 in. wide and 6 ft, 10½ in. high. It weighs about 1,650 lbs and even when fully loaded, can be handled by most ship and pier cranes.

The container frame consists of four corner posts formed of 11-gauge sheet steel into 9 by 9 in. open box-shaped sections. These are connected at the top and bottom by angle members. The walls are of 18-gauge steel sheets formed to provide vertical reinforcing corrugations about 4 in. wide by 2 in. deep. The floor is of 16-gauge sheet steel and is laid on reinforcing 14-gauge sheet steel with formed corrugations. Reinforcing straps across the bottom serve as rests for fork trucks.

The roof is of 16-gauge corrugated steel covered by flat 16-gauge sheet steel. Double doors, made of the same material as the walls, form an opening 57 in. wide by 71¼ in. high. Latches at the top and

bottom of the door are operated by a lever, which is equipped with a hasp that enables the container to be secured with a padlock or seal.

For crane handling, horizontal pins or lugs are provided in the four corner recesses of the roof. A bridle suspended from a crane boom can be hooked around the lugs to lift the container.

☆ ☆

New Die Steels Have High Impact Strength

LATROBE ELECTRIC STEEL CO., Latrobe, Pa., has begun production of new die steels said to possess an exceptionally high impact strength. An even dispersion of free carbides is achieved in the body of the steel, eliminating grouping of the carbides in a brittle central mass. This is claimed to lessen warpage and breaking and give more consistent results under heat treating.

Grades manufactured are Select B, a modified chrome, air-hardening steel; G. S. N., a high-carbon, high-chrome oil-hardening steel; Cobalt Chrome, a high-carbon, high-chrome, cobalt air-hardening steel, and Olympic, a high-carbon, high-chrome air-hardening steel.

☆ ☆

Pullman Standard Welds New Box Cars

SAID to be the latest creation in railroad box cars, the model "P-S-1" produced by Pullman-Standard Car Mfg. Co., Chicago, incorporates in a single car all of the best developments unearthed by many years of freight car manufacturing research. The new car is engineered for continuous production, and orders for it are already close to the 10,000 mark.

An important structural feature of the new car is the widespread use of welding instead of riveting. In the construction of car sides, for example, where it has been customary to use rivets or spot welds, the side sheets are now being arc welded through utilization of an automatic process perfected by Pullman-Standard. The welded draft lugs being used in the car were approved as superior to the old-style riveted type by tests made at Purdue University. The new welded center fillers were found to surpass the Association of American Railroads' lightweight riveted model in tests conducted by Professor M. B. Lagaard of the civil engineering laboratories at Northwestern University Technological Institute. Superiority of the submerged-melt welded construction of the car sides was determined by tests made on a comparative basis with riveted sides built to AAR specifications. A similar result was reached in comparison of the Pullman welded body bolsters and the AAR riveted variety.

☆ ☆

Portable Welding Co. Moves to New Location

PORTABLE WELDING CO., has moved to its new location at 1114-18 Cass St., Ft. Wayne, Ind. Owners K. E. McNeal and G. L. Coleman have also added facilities for shop and additional portable welding work. The organization specializes in lead burning, hard-facing, repair of heavy castings, case hardening, tool welding, trailers and trailer hitches and custom fabrication.

Put Resistance Welding Costs on the spot

...use Ampco-Weld resistance welding electrodes in modern equipment...increase the number of welds made, substantially reduce your costs

Sturdy! Versatile! These are the words that best describe this spot and projection welder, because it provides long life operation with a minimum of maintenance.

The same words apply to the Ampco-Weld electrodes used in this machine. Here's why:

Terne plate and galvanized stock, as you know, normally require the use of R.W.M.A. Class I electrodes. Yet, these two items are easily handled by Ampcoloy 97, a Class II alloy that combines the conductivity of Class I with the hardness of Class II. The ability of Ampcoloy 97 to do such jobs gives you clean welding and longer electrode life.

MEMBER RESISTANCE WELDER MANUFACTURERS ASSOCIATION RWMA

It pays to use Ampco-Weld electrodes in your resistance welding set-up. Get a supply today and see for yourself. The Ampco-Weld line is complete—it includes standard and special holders. All products meet R. W. M. A. specifications. Call your nearest Ampco office. Write for our latest fact-filled bulletin — it is just off the press.

Ampco Metal, Inc.

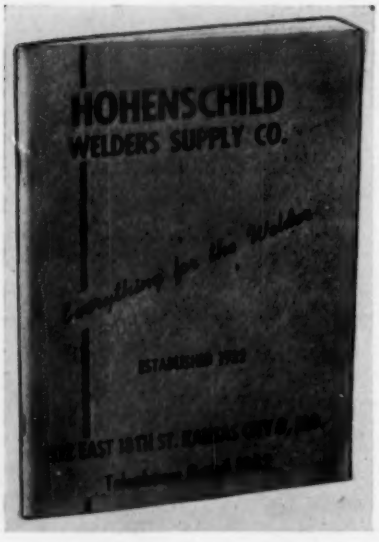
Department WE-9 Milwaukee 4, Wis.

AMPCO

Field offices in principal cities

WE-9

Photologue-------FOR WELDING CATALOG SERVICE



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"We are confident it will be a great asset to our business."

"A marvelous piece of work."

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BY W. J. Hohenschild

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Chicago Gets 1947 Metal Show

THE National Metal Congress and Exposition for 1947 will be held in Chicago beginning Saturday, Oct. 18 and ending Oct. 24, at the International Amphitheatre, West 42nd and South Halsted streets. Managing Director W. J. Eisenman predicts that more than 35,000 executives, engineers and production men will visit the exposition. Breaking all precedent, the 29th Metal Show will continue for seven days—from Saturday until the following Friday night. Attendance at the first two days will be by invitation only, which is expected to draw a large number of interested engineers and technical personnel from the Chicago area.

More than 280 exhibitors had been assigned floor space, and more than 90% of the 240,000 sq ft of space available had been allotted at the present writing.

Held concurrently with the metal show will be the 28th annual convention of the American Welding Society at the Sherman Hotel, Chicago. The American Society for Metals, the American Industrial Radium and X-Ray Society and the Iron and Steel Division and Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers will also hold technical meetings in Chicago during the same week.

☆ ☆

Control Panels Reduce Open-Circuit Voltage

OPEN-CIRCUIT voltage control panels which automatically reduce the open-circuit voltage of a-c welders from 75 to 25 volts, are reported in the recently published Allis-Chalmers Annual Review. This unit, when added to an a-c welder, protects the weldor who is working under adverse conditions of moisture, etc. It also provides instantaneous voltage recovery at the time of arc striking and reduces idling losses. The panel is produced in two models, which can be mounted on the exterior of all makes of manually operated a-c welders. Another new Allis-Chalmers development is a nickel cast-iron electrode developed for foundries to use in the repair of castings with alternating current and without preheating, except when the casting has been subjected to an extremely cold atmosphere or when it is exceptionally large.

☆ ☆

Taylor-Winfield Adds New Representative

IN ORDER to better supply the west coast users of welding equipment, The Taylor-Winfield Corp., Warren, O., has appointed Pauli and Griffin Co., 509 Sixth St., San Francisco 3, Calif., to handle sales and service of Taylor-Winfield resistance welders.

☆ ☆

Mallory Changes New York Address

P. R. MALLORY & Co. has moved its New York office to Suite 1215, 41 E. 42nd St., New York City. Headquarters and main plants remain at Indianapolis, Ind., and branch plants at North Tarrytown, N. Y., and Tipton, Ind.

REPAIRED

Punch press frame repair-welded with 52 lb. of 3/8" Tobin Bronze by the Sutton-Garten Company, Indianapolis, Ind. Job took one day for preparation and one day for welding.

RECONDITIONED

This group of worn and broken gears from wire braiding machines was quickly and economically reconditioned with Tobin Bronze Welding Rod.

...by TOBIN BRONZE WELDING

Almost any piece of equipment made of cast iron, malleable iron, steel or copper alloys can be quickly and economically repaired by oxy-acetylene welding with Tobin* Bronze.

Because of the low temperature used when welding with bronze, no serious stresses are set up, there is less chance of warping or cracking and parts can often be welded without dismantling equipment.

For years, this method of bronze welding has been used for reclaiming broken, fractured or worn equipment, or for building up bearing surfaces—at a fraction of the cost of replacement parts.

Write for Publication B-13, containing detailed information on Anaconda Welding Rods, including Tobin Bronze and "997" (Low Fuming). 47171

*Reg. U. S. Pat. Off.

ANACONDA

Anaconda

WELDING RODS

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

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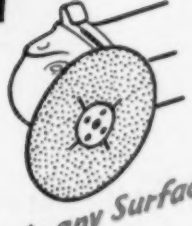
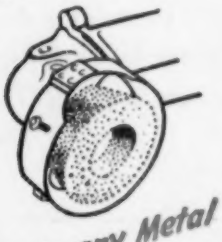
Power

to Save Time and Muscle Before and After Welding



Sands any Surface



Grinds any Metal

Speeds Wire Brushing

Van Dorn Portable Electric Sanders are packed with power to speed up a variety of welding jobs. You can quickly prepare the surface to be welded by using Van Dorn Sanders with abrasive discs and "Whirlwind"* Wire Cup Brushes to remove rust, scale, oxidation and old paint. With saucer grinding wheels, they do a fast job of "V-ing out" the joint to be welded. After the weld has been made, use Van Dorn Sanders with saucer grinding wheels for swift removal of excess metal—and with abrasive discs for a satin-smooth finish.

Ask your nearby Van Dorn Distributor for complete information on these versatile tools and for help on any tooling problem. For your free copy of our complete catalog, write to: The Van Dorn Electric Tool Co., 734 Joppa Road, Towson 4, Maryland.

*Trade Mark Reg. U. S. Pat. Off.

FOR POWER SPECIFY

"Van Dorn"

(DIV. OF BLACK & DECKER MFG. CO.)

PORTABLE ELECTRIC TOOLS

About People

FRANK B. QUINLAN, section leader in the Schenectady Works Laboratory of General Electric Co., has been awarded the Richard L. Templin award by the American Society of Testing Materials, for his outstanding contributions to science in that field. He developed an unusual pneumatic fatigue testing machine that operates on a principle entirely different from conventional machines.

☆ ☆

A. B. GIBSON, founder and president of Gibson Electric Co., Pittsburgh, has been awarded the honorary degree of Doctor of Engineering by the Clarkson College of Technology, Potsdam, N. Y. Mr. Gibson served as vice-president of the Stackpole Carbon Co., St. Mary's, Pa., from 1929 to 1933, when he founded his own company.

☆ ☆

JOHN F. CUNNINGHAM, JR., formerly research engineer and manufacturing division engineer for the Elliott Co., Jeannette, Pa., has been appointed manager of the J. P. Devine Mfg. Co. plant at Mount Vernon, Ill. The company is a subsidiary of the H. K. Porter Co.

☆ ☆

JOHN M. DIEBOLD, formerly chief production manager for Rudolph Wurlitzer Co., has been named Northern Ohio representative for Precision Welder and Machine Co., with offices at 1921 E. 55th St., Cleveland 3. Mr. Diebold has been an active member in the Detroit section of the American Welding Society.

☆ ☆

JOHN R. JOHNSTON has been appointed assistant general sales manager for Carnegie-Illinois Steel Corp. CHARLES E. MCINTYRE succeeds Mr. Johnston as sales manager in the Milwaukee district office. LOUIS J. ROHL has been appointed chief metallurgical engineer for the company, succeeding E. T. BARRON, retired.

☆ ☆

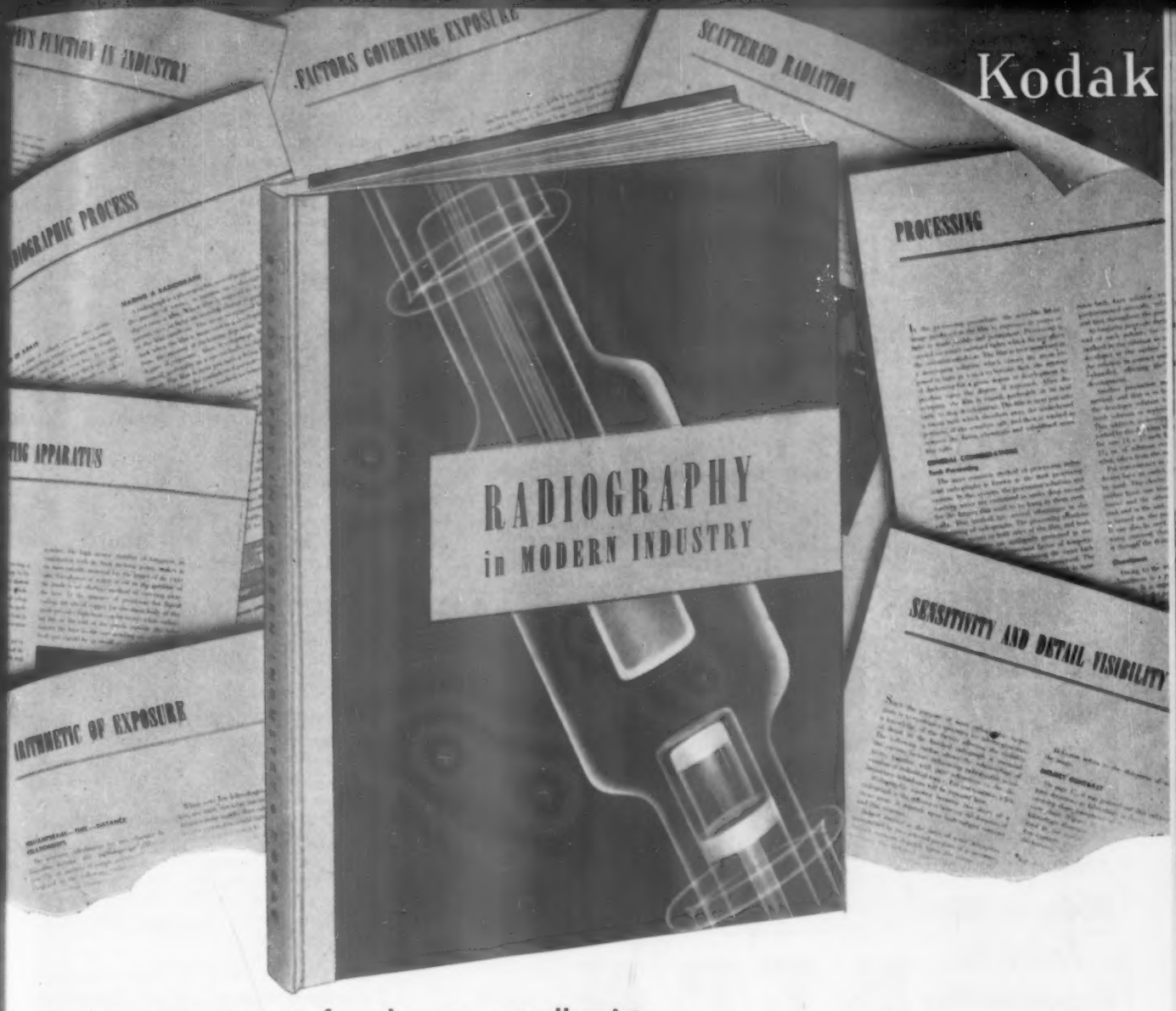
ALLAN B. KIME, formerly associated with Federal Shipbuilding and Drydock Co., N. J., in charge of welding production methods and procedures, has been appointed eastern regional manager for Ransome Machinery Co., in charge of the sale of positioning and turning roll equipment.

☆ ☆

DONALD B. ROACH has joined the staff of Battelle Institute, Columbus, O., where he will be engaged in research in welding technology. Mr. Roach holds a B. S. degree in metallurgy from the University of Illinois and is a member of the American Society for Metals.

☆ ☆

G. J. HARTNETT, JR. has been appointed superintendent of planning for The Babcock & Wilcox Company's Barberton, O., works. M. NIELSEN is named superintendent of production. L. L. DEWOEF succeeds Mr. Nielsen as superintendent of marine erection.



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. . . here's a *NEW* book that will answer your questions about x-ray practice and technics . . . clearly, quickly, authoritatively. Price $3. Order your copy now.

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Now! A NEW A-C WELDER

THAT TOPS THEM ALL

WE WANT YOU TO TRY IT NOW IN YOUR PLANT OR SHOP

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Write or Wire Today for Demonstration

KERN

HERE'S WHY

Ingenious magnetic circuit eliminates reactor coils, arc boosters. Gives peak performance from smaller, more portable welder.

2 primary, 2 secondary coils — more copper — assures HIGHER EFFICIENCY, LONGER LIFE, MORE ARC STABILITY.

Moving the core and not the coils assures HIGHER EFFICIENCY—GREATER OPERATOR SAFETY—FASTER, EASIER CHANGE OF AMPERAGE.

5 Models — 130, 180, 200, 300, 400 amps.

★ *We* know that for
INSTANT STARTING ARC
SMOOTH, SOFT ARC
CONTINUOUS STABLE ARC
ALL AROUND PERFORMANCE
the KERN Welder is the best arc welder available today. To prove this to *you* we want you to put the KERN to your severest tests. See for yourself how it works to your greatest benefit.

Kern

DISTRIBUTORS

Representation in some areas still desired. Write us today about handling this enthusiastically-received new line.

JOHN A. KERN CO. 224 N. LOOMIS ST. CHICAGO 7, ILLINOIS

R. C. ALLEN has been named manager and chief engineer of Allis-Chalmers Mfg. Company's newly formed turbo-power development department. W. A. YOST succeeds Mr. Allen as manager of the steam turbine department. FRED K. SCHROEDER has been appointed purchasing agent of foundry products and supplies for the company's West Allis works, while J. J. NIMTZ has been named purchasing agent for steel and mill products.

☆ ☆

E. G. BAILEY, vice-president of The Babcock & Wilcox Co., will be the 1947-1948 president of the American Society of Mechanical Engineers. Mr. Bailey was nominated for the office at the meeting of the society June 15-19. Nomination is tantamount to election, since only one nominee is named for each office.

☆ ☆

G. R. STEWART, formerly account executive for Young & Rubicam, Chicago, has joined National Cylinder Gas Co., as a member of the executive staff. C. P. EBERT, formerly with the purchasing department of Carnegie-Illinois Steel Corp., has been appointed purchasing director for the company.

☆ ☆

JOSEPH F. CHALUPA has been appointed manager of design engineering of the Westinghouse aviation gas turbine division, Lester, Pa. Mr. Chalupa is responsible for the production design of the company's aircraft jet propulsion engines.

☆ ☆

THEODORE E. BURKE has joined the Vanadium Corp. of America as sales engineer in the railroad division. His headquarters are at the company's district headquarters in Chicago.

☆ ☆

LT. COL. S. C. GUILLAN, T. D., has been appointed secretary of the Institute of Metals, London, and Editor of its publications.

☆ ☆

J. C. FRANTZ has been appointed director of sales research for the Apex Electrical Mfg. Co., Cleveland.

☆ ☆

RICHARD M. PAXTON, JR., has been elected a vice-president of the Jessop Steel Co., Washington, Pa.

☆ ☆

HOMER PARSONS has been appointed director of exports for American Brake Shoe Co.

☆ ☆

ED LABADIE, formerly with General Motors Corp., has been named process engineer for Progressive Welder Co., Detroit.

☆ ☆

JOHN OSWALD has been appointed executive engineer of the Ford Motor Co. He will serve as engineer of styling and body design.

☆ ☆

C. FOSTER BROWN has been named general office manager for Ceco Steel Products Corp. with headquarters in Chicago.

☆ ☆

Died . . .

HARRY A. MAURER, formerly general superintendent, director and secretary of the Oster Mfg. Co., Cleveland, died June 17, after an illness of several months.

New Products to Use

5200 Series electronic timer.

Electronic Timer

SYNCHRONOUS precision control of resistance welding is offered in the new "5203-A" electronic timer. The non-synchronous timer "5201-A" was converted to the new synchronous type by making the following changes: (a) "multiplier" switch removed; (b) addition of a name-plate to cover the hole left in the dial by the removal of the switch; (c) timing resistor employed and (d) d-c filter circuit simplified by removal of an electrolytic condenser and a filter resistor.

The 5203-A timer provides synchronous precision timing according to NEMA standard 1C19-18 for weld timing, heat timing and cool timing. Accuracy is within plus or minus ½ cycle of the setting; repetitive accuracy is ½ cycle. AUTOMATIC TEMPERATURE CONTROL CO., 34 E. Logan St., Philadelphia 44.

☆ ☆

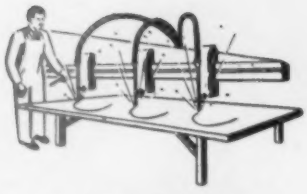
Flux-Brazing Compound

GANG brazing operations are facilitated by a new compound that contains powdered metal mixed with powdered flux. It can be used with any of the common heating methods—torch, furnace or induction.

The compound is mixed with water to form a smooth paste, which may be brushed on the work at any time prior to the actual brazing. Under the brazing heat, it melts to a liquid of low-surface tension and low viscosity, which flows over the surface to be brazed and penetrates into joints between contacting surfaces. Covered at all times by the molten flux, the joint does not develop heat oxides. AMERICAN SOLDER & FLUX CO., 2152 E. Norris St., Philadelphia 25.

FOR THESE JOBS . . .

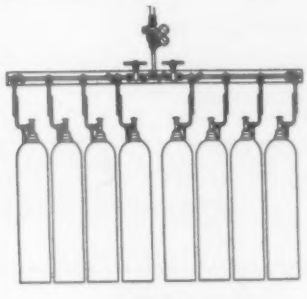
Production Welding



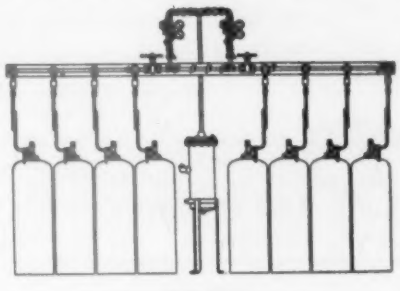
Production Cutting

. . . and operations such as welding and cutting heavy sections with hand torches, flame hardening and softening, flame cleaning . . . also any installation where a battery of cylinders is required.

YOU NEED THESE MANIFOLDS . . .



REGO
Oxygen Manifold



REGO
Acetylene Manifold

BECAUSE OF THESE ADVANTAGES . . .

- *Added Convenience* . . . Individual shut-off valves at each cylinder station permit the removal of any cylinder without shutting down one side of the manifold. Master shut-off valves control flow of each bank of cylinders.
- *Unit Construction* . . . Header assembly, mounted to steel I-beam, is virtually one piece. Extra-heavy pipe is run through header fittings, cylinder station shut-off valves and master shut-off valves, with all permanent connections silver-brazed.
- *Precision Regulation* . . . Uniform delivery pressure is assured by large capacity two-stage Regolators.
- *Exacting Tests* . . . Every RegO Manifold is subjected to a sustained air pressure test before shipment.

REGO **Manifolds for Oxygen . . . Acetylene . . . Hydrogen . . . Nitrogen and other high pressure gases.**

Series 76 cover-spectacle goggles.

Three and a Half Ounces of *PREVENTION*

- Light weight, sturdy, molded plastic construction.
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- Offers maximum eye protection.
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My wife and I made a fair exchange. I married her for her money and she married me for my mind. Now she's lost her money and I've lost my mind!

HERE'S A CRACK 6 YEARS OLD REPAIRED WITH

MANGANAL
(Trade Mark Reg. U. S. Pat. Off.)
11% TO 13½% MANGANESE NICKEL STEEL

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And the equipment is good as new! Better even. Because impact and abrasion makes MANGANAL tougher, the more you abuse it. Use MANGANAL APPLICATOR (Filler) BARS for repairing broken and worn down 11% to 14% Manganese and Carbon Steel parts. Special Shape MANGANAL APPLICATOR BARS for worn tractor grousers, clam shell and bucket lips. MANGANAL HOT ROLLED PLATES for patching power shovel buckets, drag lines, etc.

FREE FOR THE ASKING! Our Booklet, "The Welding of 11% to 14% Manganese Steel."

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Sole Producers
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Electrode tip dresser for portable, stationary and multiple-point resistance welders

Tip Dresser

INCORPORATION of a floating cutter blade in a new electrode tip dresser makes possible the precision dressing of worn spot-welding tips in a few seconds. The blade, made of hard-wearing tantalum-tungsten steel, floats in the chuck body, giving uniform cutting action on both edges and correct centering as the tip is reshaped. Tips may be dressed without removing them from the welder. The chuck can be press fit into most power dressing tools and is also threaded for use on portable drills, drill presses or lathes.

A high-speed-steel cutter ring is employed for dressing of the outside diameter of the tip before it is floated into the tool. C. O. PORTER MACHINERY CO., 666 Front Ave., Grand Rapids, Mich.

☆ ☆

Time Totalizer

DEVELOPED for use on a-c circuits, a new time totalizer or running time meter automatically registers the total operating or idle time of the circuit or machine to which it is connected. It features a counter that indicates in tenths up to 10,000 hours, then repeats. Counter may also be reset to zero. The unit is available in three models: type E5 for table use; E6 enclosed in a metal housing with hinged cover and hasp for padlocking, and E7, a 3¾-in. diameter instrument enclosed in a housing for flush panel mounting. The meter is sealed in lubricant and requires no special attention. EDWARD ROBOTHAM & CO., 24 Lewis St., Hartford, Conn.

☆ ☆

Air Gun

A REGULATING air valve, the outstanding feature of the "Bully" blow gun for air-cleaning jobs, enables the air blow to be varied from a gentle puff to a blast. Degree is determined by the amount of finger pressure applied to the regulating trigger. This 10-oz tool has no working parts to wear out and is serviceable wherever air is used for blowing away chips, shavings, filings, sand, lint, dust and dirt. SUPERIOR MANUFACTURING CO., 913 Public Square Bldg., Cleveland 13.

☆ ☆

Tungsten Electrodes

A NEW line of tungsten electrodes is announced for atomic-hydrogen and inert-gas-shielded arc welding by either manual or automatic methods. These electrodes are free from non-metallic inclusions, segregation slivers, cracks, seams and pipes. They are available in diameters ranging from .040 to ½ in. and in lengths from 3 to 24 in. (Lengths up to 60 in. can be furnished on request.) GENERAL ELECTRIC CO., Schnectady 5, N. Y.

"K-B Sealtight" tips are made of a new copper-base alloy material

Welding Tips

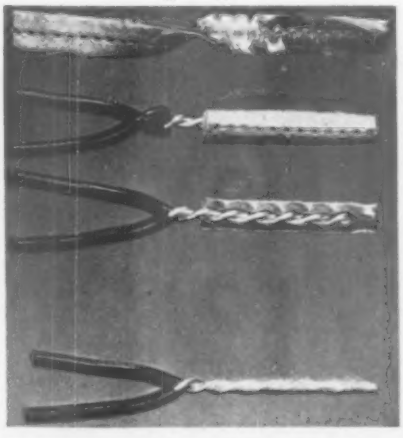
"K-B SEALTIGHT" is the name of a new line of resistance-welding tips which include seam-welding wheels and replaceable pointed, flat, dome and offset tips for spot welding. A special copper-base alloy of high electrical conductivity and high Rockwell hardness has been developed for these tips, states manufacturer. An important feature is the accurate Morse tapers, guaranteed to prevent water leakage and possible fouling. KEATING MFG. CO., Butler, Wis.

☆ ☆

Finger Guard

"OVER-END" finger protection for welding or grinding jobs is provided by a new guard that has no seam at the finger tip. The seams on the sides are well up on top of the fingers and out of the wearing zone. The guard is made in three weights of leather—light, medium and heavy—and in four sizes, including a size for the thumb. INDUSTRIAL GLOVES CO., Danville, Ill.

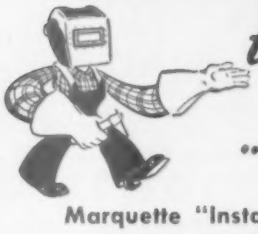
☆ ☆



Correction

This self-soldering tape, described on page 84, THE WELDING ENGINEER, July issue, is made by the W. B. FRANKLIN CO., Box 910, SAN FERNANDO, CALIFORNIA, and not San Francisco.

the SHORTCUT



to Faster Production ...and Lower Costs

Marquette "Instant Arc" A.C. Welders . . . the answer to your production problem. On light gauge sheet metal, "Instant Arc Striking" means faster welding because it is so easy to strike and hold the arc. The exclusive A.C. feature of No "Magnetic Blow" saves time and tempers on difficult jobs. Welding eliminates unnecessary drilling, tapping, riveting, etc. and makes a stronger finished product. Make quick, dependable repairs on vital production machinery without dismantling. The time you save on a single job may pay for your Marquette Welder. Maintenance men find hundreds of uses for versatile Marquette Welders . . . building racks, bins, trucks, etc. Marquette "Instant Arc" A.C. Welders are low in cost three ways . . . Low Initial cost, Low Operation cost, and Low Maintenance cost.

MARQUETTE

Instant arc A.C. WELDERS

Model 262 C has Built-In Capacitor for High Power Factor. Telnic Bronze plugs and sockets double current carrying capacity. Special transformer design delivers "Instant Arc Striking" *without* extra high frequency or booster gadgets. Wide welding range of 20 to 275 amperes. Fully Equipped. Models: 262 and 262 C (with Capacitor) 20-275 amps.; 261 and 261 C (with Capacitor) 20-200 amps. 8 additional models from 125 to 400 amps.

MARQUETTE WELDING EQUIPMENT SOLD EXCLUSIVELY THROUGH THE NATIONS LEADING DISTRIBUTORS

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REGISTERED U.S. PAT. OFFICE

Welding EQUIPMENT

A.C. ARC WELDERS · ELECTRODES
GAS WELDING And CUTTING EQUIPMENT
ACETYLENE GENERATORS · ACCESSORIES

MARQUETTE MFG. CO. INC
MINNEAPOLIS 14 MINN.

THIS *All-State* DISTRIBUTOR HAD A BUSY DAY!

_____* got 25 lbs. of All-State No. 39 Aluminum Solder Rod and 25 lbs. of All-State No. 31 Sheet Aluminum Brazing Rod for the construction of electronic equipment tables and light shields.

_____* bought 25 lbs. of All-State No. 7 Cast Iron Solder Rod for an important reclamation operation on compressor body castings.

_____* bought 1,000 lbs. of All-State No. 21 Phosphor-Copper Brazing Rod for the fabrication of oil refinery equipment.

. . . That's just part of the story of this distributor's busy day, and it's just part of the story of the All-State line of low-temperature welding and brazing alloys and fluxes. See your local All-State distributor for a demonstration. For a complete description of the All-State line send for your copy of catalog B-9.

ALL-STATE WELDING ALLOYS CO., Inc.
98 WEST POST ROAD • WHITE PLAINS, N. Y.

High-Strength Machinable Welds In Cast Iron . . .

EASIER . . . FASTER . . . CHEAPER

Talk about sound, strong, machinable welds in cast iron! Here's a way to get 'em . . . *but fast* . . . every time. Use Ni-Rod* electrodes!

Ni-Rod's easy-to-control arc speeds up all kinds of cast-iron repair work. Cuts labor, time, and costs. Raises welders' success scores on tough jobs.

Ni-Rod gives you thorough fusion . . . close color match . . . smooth bead that sheds slag. Works on A.C. or D.C.

Stocked in 3/32", 1/8", 5"32" and 3/16" sizes. Order a 5-lb. package today.

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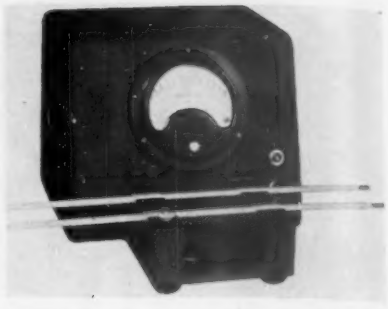


Eccentricity gauge tests rods during extrusion

Eccentricity Gauge

DESIGNED for testing the concentricity of rods during extrusion, is a new electronic gauge said to overcome the greatest problem in the coating of electrodes. Two rods from the same batch are used: one for balancing the circuit and the other for measurement. Two V-blocks are provided to steady the rods for testing. Measuring pick-ups are located under the left block, while the right one serves only as a support.

Measurement is obtained by rotating the rod in the left block, under which the measuring pick-ups are located. A meter above the blocks shows the eccentricity in increments of 0.001 in. per in. When the pointer is at right, the high side of the coating will be on top. A fine adjustment is provided to shift the pointer position to any part on the scale. The instrument automatically compensates for different rod sizes and magnetic fluxes. For rods having high magnetic fluxes, a sensitivity control is also provided. Gauge operates at 115 volts on a 60-cycle circuit, other voltages upon request. MOSLO MACHINERY Co., 2443 Prospect Ave., Cleveland 15.

☆ ☆

A-C Welders

A LARGE illuminated current-indicating scale is the dominant feature of new 300- and 500-amp a-c transformer welders, offered for operation on single-phase, 60-cycle current at 220, 440, or 550 volts. The dial is of translucent plastic, illuminated from within by a 110-volt lamp. The scale is uniformly calibrated so that the large figures are evenly spaced from minimum to maximum heat settings.

These welders are of the moving-coil type (both primary and secondary coils move when adjustment is made) with no adjustable magnetic paths. Thus, the time required to change welding heat is one-third less than would be required if one coil remained stationary. The coils are made of glass-covered copper strap and all insulation is Class B. Adjustment of current is made by means of a knob on a pressed-steel disc that serves as the top cover of the case.

Circuit reactance and no-load voltage are so balanced as to make arc starting prompt and easy for any metal thickness without special relays for this purpose. Built-in capacitors provide power factor correction. All connections are enclosed in the case, and there are no electrical connections between the power lines and the welding cables. A heavy layer of mica separates primary and secondary coils, preventing the possibility of line voltage carrying across to the welding circuit.

Hobart's industrial a-c arc welder

The case is of 16-gauge steel, rolled and welded. A fan at the bottom of the case draws in air through the louvres at the top and expels it at the bottom of the case. These welders are available as stationary or portable units and can be furnished for 50-cycle operation if desired. THE HOBART BROS. Co., Box 13, Troy, O.

☆ ☆

Drafting template for drawing all types of standard welding symbols

Drafting Template

STANDARD arc, gas and resistance welding symbols are quickly and neatly drawn with a new template (No. 34), which duplicates the welding symbols shown in the American Standards Manual. Openings are cut with beveled edges for drafting accuracy, and the legends are laminated between transparent plastic sheets and cannot wear off. Size of the template is 2¾ in. by 6¾ in. RAPIDESIGN, INC., P. O. Box 592, Glendale, Calif.

☆ ☆

Carbide Burs

LINE of ¼-in. cemented carbide burs on ⅛-in. heat-treated steel shanks is being introduced for operation in portable tools with collets up to ⅛ in. The larger size bur is said to make for faster and heavier work. Burs are available in nine different shapes. THE ATRAX CO., 240 Day St., Newington 11, Conn.

☆ ☆

Cylinder Truck

A SINGLE-CYLINDER carrier made of welded 1-in. pipe, provides quick transport of either oxygen or acetylene cylinders about the plant. Truck is 50 in. high, 20 in. wide and weighs 20 lb. The wheels are equipped with easy rolling 10 in. by 2.75 in. tires. UNITED WELDED PRODUCTS, INC., Sussex, Wis.

Important ANNOUNCEMENT

THE PIONEERS of tool and die welding electrodes introduce IMPROVED Eureka line

SLAG REMOVAL is easy when you use the improved Eureka tool and die welding electrodes. As shown above, *slag lifts of its own accord* after unit has been "Eureka-welded!" Rapid separation of slag eliminates another age-old weldor's problem!

These improved Eureka mineral coated electrodes may be used for A.C. or D.C. welding. Manipulation characteristics are greatly improved.

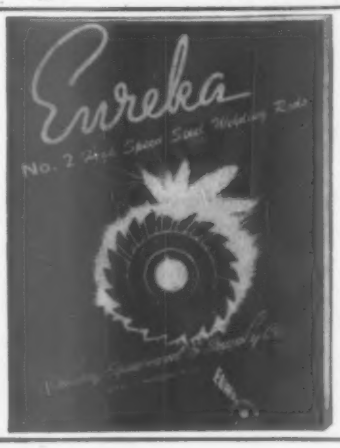
Eureka welding can save you many man hours, conserve tools and dies and greatly reduce production delays!

Welding Equipment & Supply Co.

MEMBER AMERICAN SOCIETY OF TOOL ENGINEERS

PIONEERS IN TOOL AND DIE WELDING ELECTRODES

225 Leib Street • Detroit 7, Michigan



NEW EUREKA HIGH SPEED STEEL WELDING RODS BULLETIN

Eureka No. 2 High Speed Steel Welding Rods repair high speed steel cutting tools, compositely fabricate, create cutting, wearing or bearing surfaces. Procedures given.

Welding Equipment & Supply Co.
223 Leib Street,
Detroit 7, Michigan

Rush me Bulletin explaining use of No. 2 High Speed Welding Rods.

Name_____

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Title_____

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"WELL---
WHADDA YA
KNOW!"

No — this man hasn't discovered who murdered the butler and stuffed his body in the bath-tub.

He's reading an advertisement in THIS magazine! He has his eye on a product that promises the answer to a brand new problem he's been sweating over.

Exaggerated? Not a bit! For the advertising pages of every McGraw-Hill publication are replete with ideas, products, services designed for the men who are responsible for design, production, maintenance, marketing — every specific operational phase of modern business and industry.

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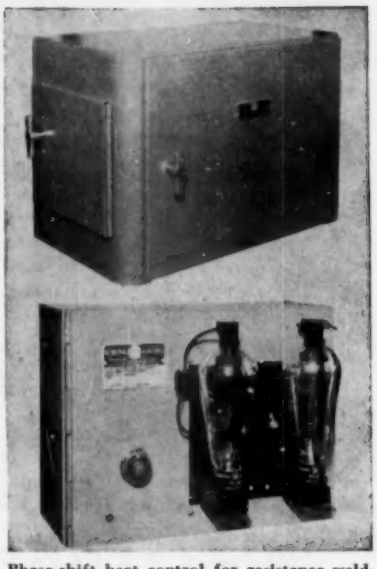
To keep in touch with the parade------
READ THE ADS.



Phase-shift heat control for resistance welding operations

R-W Heat Control

A NEW phase-shift heat control accessory for resistance welders is recommended for use with ignitron contactors or non-synchronous control combinations not having the heat control feature when power supply is 230 or 460 volts. A stepless range of from 20 to 100% (40 to 100% on 230 volts) rms current is provided.

The heat control eliminates the need for multitap welding transformers or supply autotransformers, although a welding transformer arranged for series-parallel primary is suggested for a very wide range. The dial can be mounted in easy reach of the operator or located elsewhere by extending the two-wire control cable. Panel is enclosed in a steel case suitable for mounting on a wall or atop the non-synchronous control combinations. GENERAL ELECTRIC Co., Schenectady 5, N. Y.

☆ ☆

Welding and Brazing Fluxes

"NATIONAL" is the trade name of a new line of welding and brazing fluxes said to require less heat in application. They will not cast off objectionable fumes or gases and will not deteriorate or solidify, states manufacturer. No. 5 flux is for welding cast iron; No. 10 for brazing iron, steel, malleable iron and brass castings; No. 15 for brazing gray iron and malleable castings; No. 20 for brazing brass, bronze and copper without residue. WELDING EQUIPMENT & SUPPLY Co., 223 Leib St., Detroit 7.

☆ ☆

Electrode for Sheet Metal

LOW penetration, steady uniform transfer of metal and ease of handling are some of the claims made for a new electrode, "Hobart No. 13," for the welding of light-gauge mild steel sheets. This electrode is also recommended for welding light sections of mild steel to heavier ones and for out-of-position welds on sheet metal. It is designed for either d-c straight polarity or a-c and is available in 1/16, 5/64, 3/32 and ⅛ in. diameters. THE HOBART BROS. Co., Hobart Square, Troy, O.

Easy Way To Ward Off Costly Rust

AS you know, unprotected ferrous parts are easy prey for ever-threatening rust. But you can forestall rust, before or after welding, by dipping parts in Oakite Special Protective Oil.

That way parts take on a thin transparent film that protects them against damaging indoor rust attack. And there's no pre-drying necessary, because Oakite Special Protective Oil displaces moisture. Your nearby Oakite Technical Service Representative will gladly help you work a rust prevention program into your welding procedures. Ask him to stop by with the particulars. No obligation.

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Specialized Industrial Cleaning
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WHO SAID SOMETHING DAMAGED COULDN'T BE MADE AS GOOD AS NEW

Amco Galvanizing Compound definitely repairs damaged galvanized surfaces so they are as good as new.

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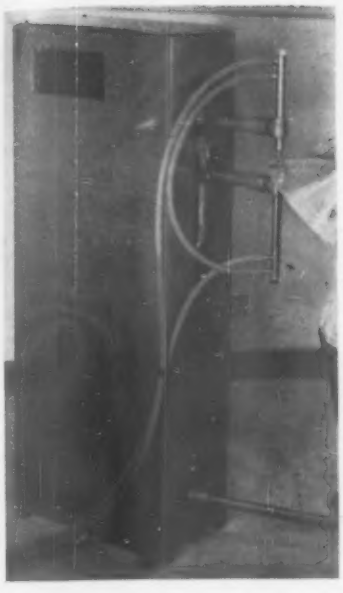
Equal in strength and corrosion resistance to the original hot-dipped galvanized surface. Easily applied by unskilled labor. Bonds perfectly to base metal without damage to surrounding galvanizing. In powder, stick and bar form.

Write on your letterhead for free sample.

AMERICAN SOLDER & FLUX CO.
2156 E. NORRIS ST., PHILADELPHIA 25, PA.



Spot welder with built-in magnetic contactor

Spot Welder

A 10-kva spot welder, made by the Federal Machine and Welder Co., is being sold and serviced by THE DOALL CO., Des Plaines, Ill. This machine has an automatic electronic timing device and a built-in magnetic contactor to provide consistent welds on a production basis. Other features are: vertical-plane action for true pressure; high-power-factor, water-cooled transformer; adjustable horns; water-cooled electrode holders; adjustable stroke and treadle mechanism and six-tap voltage selector. The unit operates from a 220-volt, 60-cycle power source and the timer from a 110-volt, 60-cycle power source and the time from a 110-volt, 60-cycle circuit.

☆ ☆

Largest "Steelweld" pivoted-blade shear is capable of cutting 12 ft of ¾ in. steel

Pivoted-Blade Shear

THE largest "Steelweld" shear ever built employing the pivoted-blade principle is capable of cutting 12 ft of ¾-in. steel plate at 30 strokes per minute. Its 36-in. throat permits slitting of very wide plates.

Turning a hand crank changes the gap between the knives, and a large dial indicates the clearance in thousandths of an inch. A back gauge floating on ball bearings is quickly adjusted by a crank placed at the right end near the bed of the machine. The electrically operated foot switch may be moved about the floor to the best working position. Both frame and blade are of all-welded one-piece construction. THE CLEVELAND CRANE & ENGINEERING CO., Wickliffe, O.

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Type SR 18" Manway and swing cover of #347 Stainless with mild steel trim.

Quotations will be given our immediate attention—Bulletin 4-61 and current price schedule M-47 will be sent upon request.

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IDEAL FOR DAILY USE IN—

Garage and body shops, cooking utensils and sheet metal plants, airplane factories—wherever general welding is done.

Here's an outfit that has proved its efficiency and economy of use in thousands of shops all over the country. Each unit has been especially designed and selected to provide an outfit complete for every light welding requirement. Adaptable for oxygen, acetylene and hyrdogen gas, for sheet or fabricated metal—ferrous or non-ferrous. We'll be glad to tell you more about this outstanding outfit.

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POSITIONED WELDING CAN REDUCE YOUR COSTS

Because C-F Welding Positioners make every weld a downhand weld, your welding time and cost is cut to a minimum. Positioned welding permits use of larger electrodes—fillets of correct width and depth can be laid in one pass, with resulting time and material saving PLUS better welding. C-F Positioners with Variable Speed table rotation in any range from 0 rpm and up provide greater flexibility of positioner use in all types of automatic or hand welding. Like all C-F Positioners, these power operated models tilt 135° from the horizontal and full 360° table rotation is possible at any angle.

Investigate the definite cost-saving advantages of C-F Power or Hand Operated Positioners. All models have either variable or constant speed control of table rotation. Write for Bulletin WP.

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Throughout the World

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CAST ALUMINUM

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PLAIN AND ALLOYED GRAY IRON

WELDING RODS

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THE CHICAGO HARDWARE FOUNDRY CO

Dependable Since 1897

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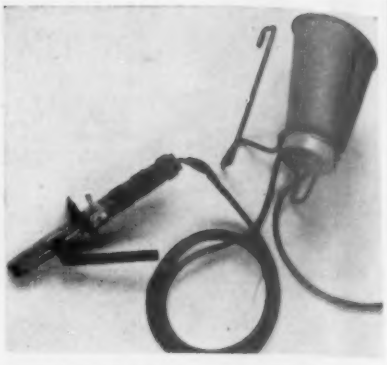

"Weld Lighter" helps to find where the arc should be struck on small jobs

"Weld Lighter"

A NEW device makes it possible to see where the arc is being struck. A flip of a toggle switch on the electrode holder brings into play a concentrated beam of 10,500 candlepower. This light is then extinguished by the same switch as soon as an arc is established. The 150 watt Pyrex bulb is housed within a conical shade that may be focused in any desired direction. A swivel base allows for a 100-deg horizontal turn and a 90-deg tilt up or down. The base also has two hook-shaped toes that permit the light to be hung from various angles and positions. Two eight-foot rubber-covered cords extend from the lamp: one to a 110-volt current source and the other to the toggle switch on the electrode holder. A foot-pedal may be substituted for the holder switch if desired. PLYMOUTH EQUIPMENT & SUPPLY CO., P. O. Box 58, Plymouth, Mich.

☆ ☆

Level indicator for angles up to 360 deg

Level Indicator

A COMBINATION level and angle indicator is announced for sheet metal and structural steel work and pipe construction. It consists of a 1½-lb. heat-treated aluminum frame, 16 in. long, 3 in. wide and ¾ in. thick, holding four vials of fluid—two horizontal and two vertical. Angles, slopes, pitches, inclines, etc., to either horizontal or vertical surfaces are thus quickly determined. The degrees of the angle are read on a dial indicator calibrated from 0 to 360 deg. R-D Co., P. O. Box 912, Flint, Mich.

☆ ☆

Power Transformers

POWER and lighting transformers in sizes from 1 to 100 kva are offered by Lindberg Engineering Company's transformer division. These products, states manufacturer, are made to operate at rated frequency and on any of the rated voltages up to 600 volts. All units include a wiring compartment with knockouts to facilitate any desired arrangement. Transformers rated from 1 to 15 kva are totally enclosed for outdoor and indoor use. LINDBERG ENGINEERING CO., TRANSFORMER DIVISION, 2444 W. Hubbard St., Chicago 12.

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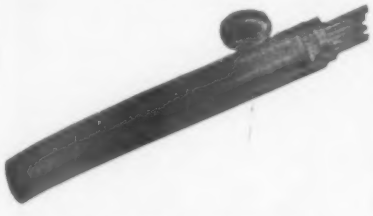
for Welding of ALUMINUM

ELECTRIC AND GAS WELDING

Drawn Wire

Types 25, 43 and 52

Brazing 716 (low temperature)



FOR CAST ALUMINUM

Use Extruded Rods

Types 142, 195, 355 and 356

for Better Welding

3/16" size only

Aluminum Solder

White Metal

Welding Alloys Manufacturing Co.

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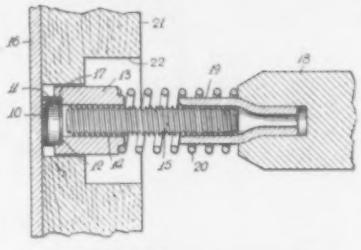
From the Patent Office

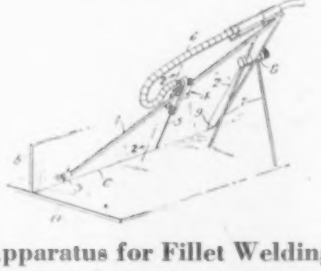


Stud-Welding Apparatus

2,421,184. ALBERT M. CANDY. La Grange, Ill., assigned to HOLLUP CORP., Chicago. Filed April 3, 1944. Issued May 27, 1947.

A stud-welding apparatus, with an adapter having a socket for detachably holding a stud and pressing it against the part to which it is to be welded. The apparatus is for use in connection with a flat-ended ferrule of heat-resistant material; apparatus has a sleeve provided with a central passage through which the stud may move, one end of the sleeve being recessed to provide a socket for receiving and centering the ferrule. The inner end of the socket forms a shoulder for engaging one end of the ferrule. A spring engages the other end of the sleeve so that the sleeve presses the ferrule against the part during movement of the adapter and stud toward the part.

☆ ☆



Apparatus for Fillet Welding

2,421,095. JOSEPH M. TYRNER, N. Y. assigned to AIR REDUCTION SALES CO., INC., New York City. Filed April 3, 1945. Issued May 27, 1947.

Arc-welding apparatus for making fillet welds along a work corner. A guide is supported so that it is downwardly inclined and also inclined with respect to the vertical wall of the work corner; guide is adjustable to vary the angle of inclination. Movable downwardly along the guide is a carriage on which a welding electrode is supported at its upper end. The downwardly inclined guide is the sole guiding means for the electrode and serves by reason of its inclination in the two directions to keep the tip of the electrode in contact with the work and induce it to follow the work corner, even though the lower end of the electrode is unguided except by the work corner itself.

miller

WELDERS

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SPEED—*as much as 35% faster—no magnetic arc blow.*

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—reduce power costs up to 50% below comparable D.C. equipment.

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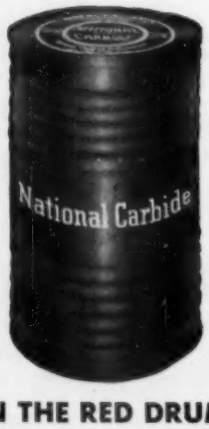

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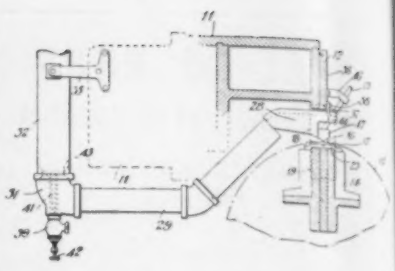


Gas Steam Welder

2,421,469. DONALD L. SMITH, Dunellen, N. J., assigned to AIR REDUCTION SALES CO., INC., New York City. Filed Oct. 21, 1944. Issued June 3, 1947.

In combination, an oxy-acetylene seam-welding machine for welding metal barrels, tubes or the like, including a support for the barrels and a bracket overhanging the support in alignment with the seam edges of the barrel. Two sets of mill rolls are located in spaced relation to one another along the support, one roll of each set engaging the inner surface of the barrel and the other roll of the set engaging the outer surface of the barrel. A welding head located between the sets of rolls is adapted to direct flames upon the barrel seam edges. Exhaust mechanism for drawing off the products of combustion comprises an exhaust hood disposed between the sets of mill rolls and having an open end through which the welding operation can be observed. A conducting pipe and flue receives the products of combustion collected by the hood; these extend laterally under the bracket and upwardly to provide a chimney by which a natural draft is formed to draw upward the products of combustion enveloped by the hood.

☆ ☆

Electrode Cooling System

2,422,962. FRANZ R. HENSEL and EARL I. LARSEN, Indianapolis, assigned to P. R. MALLORY & CO., Indianapolis. Filed March 11, 1944. Issued June 24, 1947.

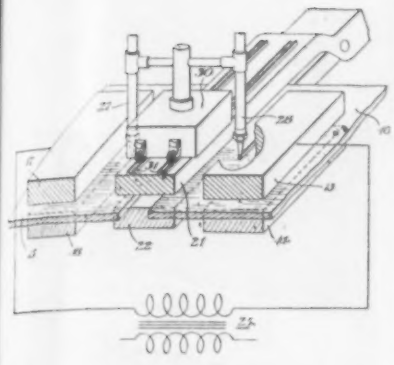
In a cooling system for a spot-welding electrode, the combination which comprises a hollow tubular electrode holder adapted to be clamped to the arm of a welding machine and an electrode having an inner recess in communication with the space within the holder. An inlet tube for cooling fluid extends through the holder into the recess of the electrode. A conduit introduces cooling fluid into the recess through the inlet tube and discharges such fluid through the tubular holder. The terminal regions of the walls of the inlet tube internally define a contracting entrance cone and a constricted throat and externally define with the surface of the recess an expanding annular channel.

☆ ☆

Hard-Facing Alloy

2,422,949. ARTHUR T. CAPE, Columbus, and CHARLIE V. FOERSTER, Canton, O., assigned to COAST METALS, INC., Canton. Filed Feb. 9, 1945. Issued June 24, 1947.

A ferrous alloy containing from 3.75 to 4.6% carbon, from 8 to 28% chromium, from 6 to 12% molybdenum, from 1 to 3% silcon and nickel in appreciable amounts up to about 1.75%. The balance of the alloy is substantially all iron.



Butt-Welding Apparatus

2,422,787. HENRY O. KLINKE, Forest Hills, N. Y., assigned to AIR REDUCTION SALES CO., INC., New York City. Filed Feb. 8, 1946. Issued June 24, 1947.

A method of trimming and butt welding the adjacent ends of metal strips or plates. First the end portions of the strips are clamped at opposite sides of the region where the trimming and welding is to be effected and along areas which are spaced apart longitudinally of the strip sections and which extend transversely of them. Adjacent edge portions of the strip sections to be severed are also clamped, and the end portions which lie inwardly of the spaced clamped areas are heated to approximately red heat. The end portions of the strips are cut thermochemically along transverse lines while they are at red heat. The severed edge portions of the strips are withdrawn while still clamped, and the trimmed and still clamped end portions are then moved together to effect a butt weld while they are at welding temperature.

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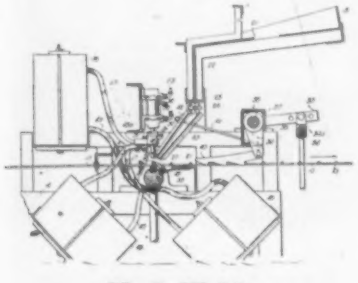

Mesh Welder

2,422,829. JOSEPH A. FOTIE, Kansas City, Mo. Filed April 2, 1945. Issued June 24, 1947.

An apparatus for welding wire mats made up of a plurality of longitudinal and cross wires welded at their intersections. Elements are a frame, straightening means through which the longitudinal wires are fed, cross wire feeding means adapted to deliver cross wires singly and transversely of the longitudinal wires at spaced intervals and welding electrodes positioned above and below the points where the cross wires are deposited onto the longitudinal wires. A feeding device advances the mat and unwelded longitudinal wires subsequent to each welding operation. A power-operated roll and its carriage are synchronized with the feeding device to take up the length of the mat advanced and roll it upon the roll.

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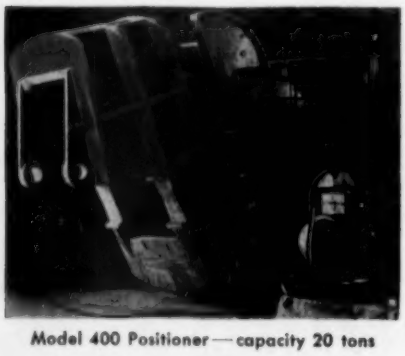

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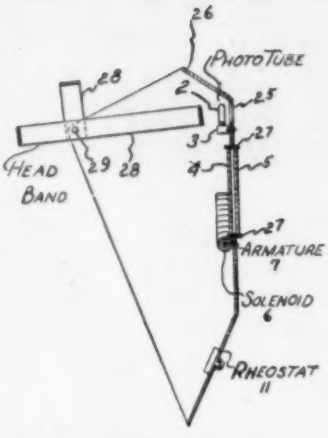

Polarized Welding Lens

2,423,320. SAMUEL C. HURLEY, JR., Danville, Ill. Filed July 29, 1944. Issued July 1, 1947.

An eye shield and helmet with a light-transmitting viewing unit. The latter has two polarizing elements, the second being superimposed adjacent to the first. Polarization axes are normally parallel, but the second polarizing element is mounted for rotation through an angle of about 90 deg with respect to the polarizing axis of the first polarizing element. A photo-electric device controls the rotation of the rotatable polarizer to maintain the light passing through the light-transmitting unit within predetermined limits. An adjustable means is operatively associated with the photo-electric device and power unit for adjusting the degree of rotation of the element resulting from a predetermined change in light intensity.

☆ ☆

Method of Making Tip

2,423,203. SAMUEL R. OLDHAM, West Orange, N. J., assigned to UNION CARBIDE AND CARBON CORP., New York City. Filed Feb. 20, 1943. Issued July 1, 1947.

A method of making a torch tip blank of ductile metal, such as copper, having an annular series of longitudinal passages. The method comprises telescopically fitting a core consisting of a length of longitudinally grooved barstock within a tube of constant internal diameter throughout its length. The resulting rod-tube assembly is then heated to a temperature of 1,600-1,700 F while being supported between dies so as to permanently unite the parts into one piece of homogeneous metal.

☆ ☆

Tube Mill

2,423,188. HARRY T. HERBST, Baltimore, Md., assigned to UNION CARBIDE AND CARBON CORP., New York City. Filed Feb. 2, 1944. Issued July 1, 1947.

In apparatus for manufacturing pipe or tubing, a carriage movably mounted on a support and a pair of oppositely disposed torches mounted on the carriage for heating the edges of the skelp. The torches may be adjusted toward and away from each other for different widths of skelp; a remote control connected to the carriage mounting adjusts the position of the torches with respect to the path of the skelp.

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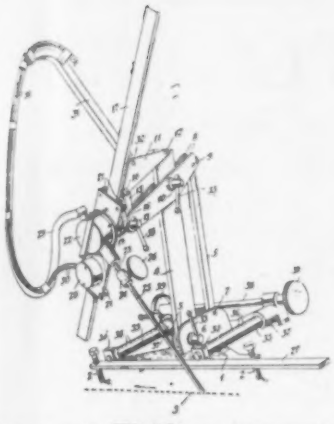

Automatic Welding Apparatus

2,422,811. JOSEEPH M. TYRNER, N. Y., assigned to AIR REDUCTION SALES CO., INC., New York City. Filed May 15, 1945. Issued June 24, 1947.

Arc-welding apparatus comprising means for guiding an electrode along the seam to be welded. The lateral inclination of the electrode is adjusted by a means comprising an adjustable folding parallelogram support having a system of pivoted links. This device is adapted when folded or unfolded to tilt the electrode laterally about its tip as a center when the tip is positioned at the seam to be welded.

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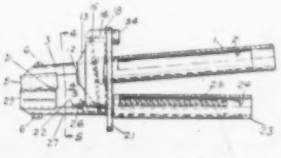

Electrode Holder

2,421,723. DONALD TRENTHAM SMOUT and DONALD DUPREE SMOUT, Darlington England. Filed June 14, 1945, in Great Britain, Jan. 20, 1944. Issued June 3, 1947.

An electrode holder comprising a pair of tubular metallic members terminating in electrode-gripping contacts. Each tubular member has fastened thereto a support piece, one piece being pivotally mounted within and on the other. A bolt and cooperative spring carried in one of the tubular members is operatively connected to the pivoted piece. A guard member of insulating material is fastened to the other piece. Insulating tubes are positioned over the tubular members and extend up to the guard member.

☆ ☆

Preheater Torch

2,418,208. GEORGE L. WALKER, Jersey City, N. J., assigned to AIR REDUCTION SALES CO., New York City. Filed Nov. 4, 1943. Issued April 1, 1947.

A gas torch having an elongated block constituting the torch tip. Block has a longitudinally-extending recess in the face and gas passages so formed that a plurality of discharge orifices open into laterally enlarged portions in the recess. The total area of the discharge orifices in each enlarged portion is substantially less than the area of the laterally enlarged portion.

CHEK-SHOCK OXYGEN CUSHION VALVE

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PRICE IS LESS THAN ONE REPAIR BILL ($6.00 EA.)

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★ Projects $500,000 and more in value.
† Federal Government Projects.

Plate Welding Pipe & Tank

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California—GAS PIPELINE—Union Oil Co. of Calif., Union Oil Bldg., Los Angeles, 16,000 ft. 7- to 10-in. pipeline on Rosencrans Ave. and Studebaker Rd., southwest of Norwalk, Los Angeles Co., to Pacific Pipeline & Engineers, Ltd., 2268 Firestone Blvd., Los Angeles. Approx. **$50,000.** Awarded 6/17.

Low Bidder

†Md., Frederick — STEAM LINE — U. S. Eng., War Dept. Bldg., 21 St. and Virginia Ave. N. W., Wash. 25, D. C., high pressure steam line, altering steam line, Proj. 49-080-47-129 (33) M, from J. E. Dockstader, Munsey Bldg., Wash., D. C. **$470,000.**

Contract Awarded

Minn., Minneapolis—OIL STORAGE, etc.—Spencer Kellogg & Sons, 1054 Grain Exchange Annex, linseed oil storage bld., incl. warehouse and steel tanks, 25 Ave. SE and 4 St., to B. H. Stahr Co., 239 Foshay Tower, approx. **$112,000.**

Contract Awarded

Missouri—CRUDE OIL PIPELINE—Stanolind Pipe Line Co., Fair Bldg., Fort Worth, Tex., 17 mi. 16 in. crude oil pipeline from Freeman to Sugar Creek, to McVean & Roberts, Odessa. Approx. **$425,000.**

Contract Awarded

Mo., St. Louis—STORAGE TANKS—American Can Co., 3200 S. Kingshighway Blvd., Zone 9, installing 6 steel storage tanks and concrete fdns. at above address, sub-contracts. Over $40,000. A. O. Degling, 230 Park Ave., New York, N. Y., engr.

Contract Awarded

★ **Mont., Billings**—REFINERY—Carter Oil Co., Billings, oil refinery, to Fluor Corp. Ltd., P. O. Box 7030, Los Angeles, Calif. **$1,341,000.**

Low Bidder

†Oregon — WATER SUPPLY — U. S. Eng., Pittock Block, Portland, water supply and distr. sys., at McNary Housing area, from Del R. Beebe, Eugene, **$354,701.** Est. $305,573.

Contract Awarded

Pa., Phila.—TOWER and TANK—Fels & Co., 73 St. and Woodland Ave., steel tower and tank, to Chicago Bridge & Iron Co., 1700 Walnut St. Over **$56,000.** Sauter & Castor, 1411 Walnut St., engrs.

Contract Awarded

Texas—GAS LINES—Shamrock Gas & Oil Co., Dumas, 24,000 lin. ft. 20 in. residue gas lines and 6 mi. 6 in. gas gathering lines, near Dumas, to Vaughn & Taylor, Dumas. Approx. **$210,000.**

Contract Awarded

★ **Texas**—PIPELINE—Texas Pipe Line Co., Texas Co. Bldg., Houston, 172 mi. 10¾ in. products pipeline between Hearne and Dallas and 26 mi. 8⅝ in. line between Dallas and Fort Worth, to Associated Contractors & Engineers, 4001 Homestead Rd., Houston. Approx. **$3,475,000.**

Contract Awarded

Texas—OIL PIPELINE — Sinclair Refining Co., 840 S. Lamar St., Dallas, taking up and relaying approx. 2 mi. 3 and 6 in. oil pipeline, near Dallas, to Vaughn & Taylor, Wichita Falls. Approx. **$40,000.**

Contract Awarded

★ **Texas**—PIPELINE—Sinclair Refining Co., and Sinclair Oil Corp., Gulf Bldg., Houston, to O. C. Whitaker Co., D. Waggoner Bldg., Fort Worth, 105 mi. 8 in. welded joint products pipeline between Victoria and Austin, approx. **$1,575,000;** 51 mi. 6 in. line between Luling and San Antonio, **$515,000;** 85 mi. 8 in. products pipeline between Austin and Bryan, **$1,275,000;** 75 mi. 8 in. welded joint products pipeline from Corpus Christi to Victoria, approx. **$1,125,000.** Grand total approx. $4,490,000.

Contract Awarded

†Tex., Corpus Christi—STEAM LINES DISTRIBUTION SYSTEM, etc.—U. S. Govt., Naval Air Station, Officer-in-Charge, replacing steam lines distr. sys. radiating from central power plant, NOY 14293, Spec. 18357, to Tellepsen Constr. Co., 3900 Clay St., Houston. **$159,771.** Bids 6/24.

Low Bidder

Tex., Houston—STEEL TANKS, etc.—Harris County Water Control & Imprvt. Dist. 10, 4300 Castro St., Contr. 1, WW distr. sys., from Gerald Mora, 312 Sabine St., **$79,817***** Contr. 3, elevated steel tank and tower, from Chicago Bridge & Iron Wks., 5625 Clinton Dr., approx. **$23,000***** Contr. 5, warehouse, pumphouse, from Tellepsen Constr. Co., 3900 Clay St., **$57,000.**

Contract Awarded

†Va., Fort Belvoir—WATER TANK—U. S. Eng., 1 and Douglas Sts., N.W., Wash. 25, D. C., dismantling and replacing 300,000 gal. water tank, Ser. W-44-008-47-8, to Chicago Bridge & Iron Co., 1700 Walnut St., Phila., Pa. **$28,980.**

Contract Awarded

Wis., West Milwaukee—BOILER HOUSE—Chain Belt Co., 1600 W. Bruce St., Zone 3, 1 story, 60x80 ft., steel, brick, boiler house, to Hunzinger Constr. Co., 4541 N. 124 St., Milwaukee, Zone 13. **$114,378.** Eschweiler & Eschweiler, 720 E. Mason St., Zone 2, archts.

Structural Bridges and Other

Low Bidder

Arizona—BRIDGE—State Hy. Comn., Phoenix, June 25, Santa Maria, bridge on Wickenburg-Kingman Hy., from H. L. Royden, 211 W. Jackson St., Phoenix. **$187,493.**

Contract Awarded

Calif., Albany — RACE TRACK, etc. — Pacific Turf Club, Inc., Albany, rehabilitating race track, grandstand, clubhouse and stables, to Swinerton & Walberg, 225 Bush St., San Francisco. Est. **$250,000.**

Contract Awarded

Calif., Vallejo—STADIUM—Vallejo Unified School Dist., 640 Carolina St., stadium at Corbus Field for Vallejo High School and Jr. College, to Recknagel & Yoemans, 726 Kentucky St., **$111,333.** Bids 5/12.

Contract Awarded

Fla., Fort Lauderdale—RECEIVING STATION—Tropical Radio Telegraph Co., 1 Federal St., Boston, Mass., general contract receiving station, to Caldwell-Scott Constr. Co., Inc. of Florida, 120 S. W. First Ave. Est. **$200,000.**

Contract Awarded

Fla., Jacksonville—BROADCASTING TOWER—City, steel broadcasting tower for Municipal Radio Station WJAX, to Miller Electric Co., 247 Riverside Dr. **$41,675.** Bids 5/15, awarded 6/26.

Contract Awarded

Fla., Miami Beach—BRIDGE—M. M. Steinhart Co., c/o contractor, bridge over Tatum Waterway, 85 St., to G. E. Bunnell Co., 79 NE 20 Terrace, Miami. **$75,000.**

Low Bidder

Ga., Decatur — STADIUM — Decatur City School Bd. Educ., June 17, stadium addn., Boy's High School Field, from Griffin Constr. Co., 452 Spring St. N. W., Atlanta. **$114,000.**

Contract Awarded

†Louisiana—SWING APRON—U. S. Eng., foot of Prytania St., New Orleans, Woodlawn Bridge, 150 ft. steel girder swing apron with creosoted timber approaches over Vermilion River. Vermilion Parish, to Austin Bridge Co., 1000 Singleton Blvd., Dallas, Tex. **$109,116.** Bids 6/9, awarded 6/19.

Low Bidder

Maine — BRIDGES — State Hy. Comn., Augusta, June 25, 3 bridges, Cumberland Co., from Ellis C. Snodgrass, Inc., 465 Congress Ct., Portland, combined bid, **$335,550;** alternate Royal River Bridge, **$173,265;** Main St. separation, **$98,988;** East Main St. separation, **$67,900;** rein.-con. underpass, from P. E. Sust, Pittsfield, **$125,474.**

Low Bidder

★ **Mich., Sault Ste. Marie**—BRIDGE—Sault Ste. Marie Bridge Co., Sault Ste. Marie, June 24, reconstructing bridge over South Canal, St. Mary's Falls, St. Mary's River, from American Bridge Co., 71 Broadway, New York 6, N. Y. (a), **$1,599,046;** (b), **$1,609,431.**

Low Bidder

Mississippi—BRIDGES—State Hy. Comn., W. Spiva, dir., Jackson, June 24, bridges, 0.078 mi. hy. between Acona and Lexington, Holmes Co., from Pigford Bros., Meridian, **$66,971.** Est. **$65,000.**

Low Bidder

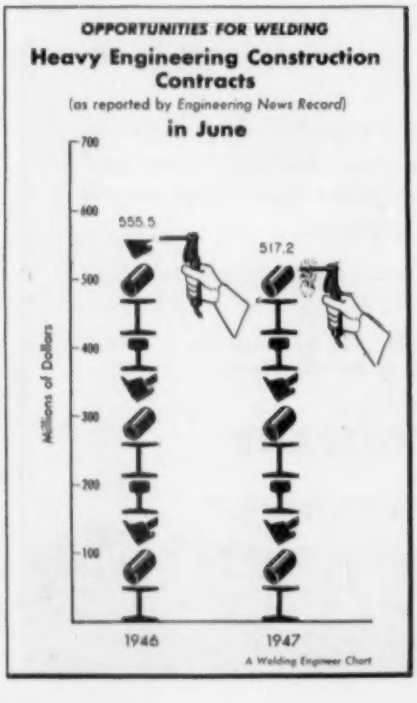
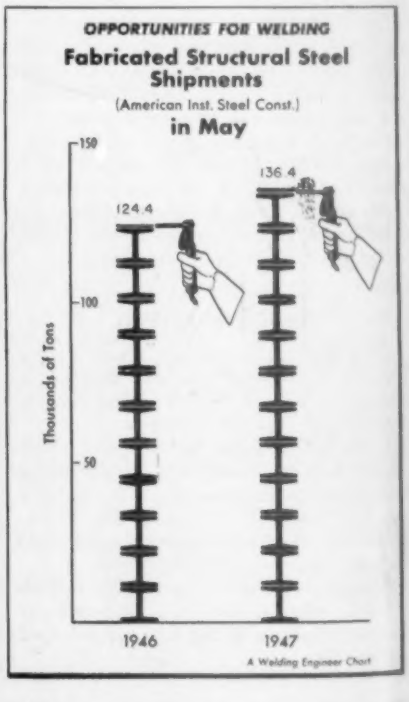
★ **N. Y., New York**—VIADUCT SUPERSTRUCTURE—President Manhattan Boro. Municipal Bldg., Zone 7, June 23, viaduct superstructure for elevated public highway in west and marginal sts. from Duane to Barclay Sts., etc., from Lynn Constr. Co., 11 W. 42 St., Zone 18. **$1,088,665.**

Low Bidder

North Carolina—STRUCTURES—State Hy. Dept. and P. Wks. Comn., Raleigh, June 24, structures, 0.67 mi. Gaston Co. from Harvey H. Stewart, Box 1392, Charlotte, Zone 4. **$93,539.** Est. **$75,000-$100,000.**

Contract Awarded

Okla., Stillwater — STADIUM — Oklahoma A. & M. College, stadium addn., Lewis Field, to Manhattan Constr. Co., Muskogee. **$277,711** (exclusive of structural steel). Est. **$286,000.** Bids 6/23, awarded 6/26.

Low Bidder

Texas—BRIDGE SUPERSTRUCTURE—State Hy. Comn., Austin, June 25, superstructure Colorado River bridge and roadway ap-